

UMM MESHRAT I AND II:
TWO LATE NEOLITHIC SITES ALONG THE
WADI ATH-THAMAD, JORDAN

A Thesis Submitted to the College of
Graduate Studies and Research
in Partial Fulfillment of the Requirements
for the Degree of Master of Arts in the
Department of Anthropology and
Archaeology
University of Saskatchewan
Saskatoon

By
Dawn Nadine Cropper

Fall 2002

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a Postgraduate degree from the University of Saskatchewan, I agree that the Libraries of this University may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purposes may be granted by the professor or professors who supervised my thesis work or, in their absence, by the Head of the Department or the Dean of the College in which my thesis work was done. It is understood that any copying, publication, or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of Saskatchewan in any scholarly use which may be made of any material in my thesis.

Requests for permission to copy or to make other use of material in this thesis in whole or part should be addressed to:

Head of the Department of Anthropology and Archaeology
55 Campus Drive
University of Saskatchewan
Saskatoon, Saskatchewan
S7N 5B1

ABSTRACT

Umm Meshrat I and II are two adjacent sites located in the Wadi ath-Thamad survey area, approximately 20 km southeast of Madaba, Jordan. The survey team carried out surface collections and preliminary test probes at Umm Meshrat I and II during the 2001 season of the Wadi ath-Thamad project. The lithic and ceramic collections from both sites are the focus of this thesis.

The analysis of the lithic and ceramic collections from Umm Meshrat I and II were carried out using lithic typology established by McCartney and Betts (1998) and the ceramic typology established by Garfinkel (1999). These particular typologies were selected in an effort to make the data from Umm Meshrat I and II comparable with other Late Neolithic sites in the southern Levant.

The analysis demonstrated that both sites exhibit characteristics typical of the Late Neolithic period. Among the chipped stone assemblage, these typical artifacts include tile knives, ha-Parsa points, burins, drill bits on spalls, and debitage classes dominated by flakes. The pottery assemblages show similarities with both the Jericho IX and Yarmoukian traditions of the Late Neolithic period. Several decoration styles were identified in the collections from Umm Meshrat I and II including: wide painted lines, incised herringbone decoration, red painted triangular motifs, incised frames, and burnished red slip. Due to the small sample size the ceramic tradition at Umm Meshrat I and II could not be determined.

While the analysis did not identify tradition, it did securely establish that a Late Neolithic occupation is present at both Umm Meshrat I and II. This is significant because few sites have been identified within this period. Thus, any information gained from the analysis from Umm Meshrat I and II will significantly add to the body of Late Neolithic research.

ACKNOWLEDGMENTS

First and foremost, I would like to thank my thesis supervisor, Dr. Chris Foley. His passion for Near Eastern Archaeology drew me into the field of archaeology during my undergraduate years. His guidance and willingness to spend countless hours in discussion have been invaluable throughout the course of my Master's program. I also would like to thank Dr. Foley in his role as the Director of the Wadi ath-Thamad Survey. His encouragement throughout the 1999 season is what prompted me to consider graduate studies. Thank you Chris.

I am indebted to a number of people who have provided their help and support during this research. I would like to thank Dr. Michele Daviau, the Director of the Wadi ath-Thamad Project, who encouraged this project from the beginning. I would like to express my gratitude to all of the people who worked with the artifacts from Umm Meshrat I and II, both in Jordan and in Saskatoon. In particular, I would like to thank the 2001 survey team who worked diligently at the sites and undertook hours of cataloging for which I am exceptionally grateful. I would like to thank Laura Foley for her candor during my first field season in Jordan. Her support both abroad and in Saskatoon is very much appreciated. I would like to express my gratitude to Dr. Urve Linnamae, who has shared with me her great wealth of knowledge and enthusiasm for lithics.

Finally, I would like to thank my friends and family for their encouragement during the last several years. Your support, whether it has been words of wisdom, a home-cooked supper, or a much-needed diversion from school work, has meant more than I can express. Thank you.

TABLE OF CONTENTS

PERMISSION TO USE.....	i
ABSTRACT.....	ii
ACKNOWLEDGEMENTS.....	iii
LIST OF FIGURES.....	vi
LIST OF TABLES.....	vii
CHAPTER 1 - INTRODUCTION.....	1
1.1. INTRODUCTION.....	1
1.2. RESEARCH GOALS.....	3
1.3. CHAPTER SUMMARY.....	5
CHAPTER 2 - THE WADI ATH-THAMAD SURVEY AREA:	
PRESENT AND PAST ENVIRONMENTS.....	7
2.1. PRESENT ENVIRONMENT.....	7
2.2. PALEOENVIRONMENT.....	13
CHAPTER 3 - BACKGROUND RESEARCH ON THE LATE	
NEOLITHIC PERIOD.....	16
3.1. INTRODUCTION TO THE LATE NEOLITHIC PERIOD.....	16
3.2. LATE NEOLITHIC TERMINOLOGY.....	17
3.3. SETTLEMENT PATTERNS AND SUBSISTENCE STRATEGIES IN THE	
LATE NEOLITHIC.....	19
3.4. MATERIAL CULTURE OF THE LATE NEOLITHIC PERIOD.....	23
3.4.1. <i>Late Neolithic Architecture</i>	23
3.4.2. <i>Late Neolithic Art Objects</i>	25
3.4.3. <i>Chipped Stone Assemblages in the Late Neolithic Period</i>	28
3.4.4. <i>Late Neolithic Pottery</i>	32
3.4.4.1. Introduction.....	32
3.4.4.2. Yarmoukian Ware.....	34
3.4.4.3. Jericho IX Ware.....	35
3.4.4.4. Nizzanim Ware.....	35
3.4.4.5. Discussion.....	36
3.4.5. <i>Burin Sites and Stations in the Late Neolithic</i>	36
3.5. Discussion.....	39
CHAPTER 4 - UMM MESHRAT I AND II: SITE DESCRIPTION,	
METHODOLOGY, AND EXCAVATION UNITS.....	41

4.1. SITE DESCRIPTION.....	41
4.1.1. <i>Umm Meshrat I</i>	41
4.1.2. <i>Umm Meshrat II</i>	44
4.2. METHODOLOGY.....	45
4.3. EXCAVATION UNITS.....	47
4.3.1. <i>Umm Meshrat I</i>	47
4.3.2. <i>Umm Meshrat II</i>	52
CHAPTER 5 - THE MATERIAL CULTURE.....	54
5.1. INTRODUCTION.....	54
5.2. CHIPPED STONE COLLECTIONS.....	54
5.2.1. <i>Umm Meshrat Debitage</i>	58
5.2.2. <i>Chipped Stone Tools</i>	60
5.2.2.1. Arrows.....	62
5.2.2.2. Awls.....	64
5.2.2.3. Burins.....	64
5.2.2.4. Denticulates.....	67
5.2.2.5. Drills.....	69
5.2.2.6. Multiple Tools.....	70
5.2.2.7. Notches.....	70
5.2.2.8. Scrapers.....	71
5.2.2.9. Sickle Elements.....	73
5.2.2.10. Tile Knives.....	74
5.2.2.11. Truncations.....	75
5.2.2.12. Retouched Pieces.....	76
5.2.2.13. Utilized Pieces.....	77
5.2.2.14. Geometrics, Microliths, and Paleolithic Tools.....	78
5.2.2.15. Other.....	79
5.2.3. <i>Summary of Chipped Stone Collections</i>	79
5.3. THE POTTERY COLLECTIONS.....	83
5.3.1. <i>Ware</i>	85
5.3.2. <i>Decoration</i>	86
5.3.3. <i>Summary of the Pottery Collections</i>	91
CHAPTER 6 - SUMMARY AND CONCLUSIONS.....	92
REFERENCES CITED.....	99
APPENDIX A - LATE NEOLITHIC POTTERY VESSEL TYPES.....	108
APPENDIX B - PLATES: CHIPPED STONE TOOLS AND POTTERY.....	110

LIST OF FIGURES

FIGURE 1.1. Location of Umm Meshrat.....	2
FIGURE 2.1. Location of the Wadi ath-Thamad Survey area.....	8
FIGURE 2.2. The Wadi ath-Thamad Survey area.....	9
FIGURE 2.3. Section on the Wadi ath-Thamad terraces.....	11
FIGURE 2.4. Section drawing of the upper terrace at UM I.....	12
FIGURE 3.1. Art objects.....	26
FIGURE 3.2. LN chipped stone tools.....	30
FIGURE 3.3. Examples of LN pottery decoration techniques.	34
FIGURE 4.1. Close up of UM I and II with Mudayna.....	42
FIGURE 4.2. ‘Ain Thamad – spring located just below Umm Meshrat I.....	43
FIGURE 4.3. Example of the circular structures at UM II.....	45
FIGURE 4.4. Umm Meshrat I with approximate locations of units 1, 2, 3, and 4.....	47
FIGURE 4.5. UM I - Unit 3: final top plan.....	49
FIGURE 4.6. UM I - Unit 3: final section.....	50
FIGURE 4.7. UM I - Units 4 and 5: final top plan.....	51
FIGURE 4.8. UM II - Units 1 and 2: final top plans.....	52
FIGURE A-1. Yarmoukian ware Byblos jars.....	108
FIGURE A-2. Common LN pottery vessel types.....	109
FIGURE B-1. Arrows.....	110
FIGURE B-2. Awls.....	111
FIGURE B-3. Burins.....	112
FIGURE B-4. Denticulates.....	113
FIGURE B-5. Drills.....	114
FIGURE B-6. Multiple Tools.....	115
FIGURE B-7. Notches.....	116
FIGURE B-8. Scrapers.....	117
FIGURE B-9. Tile knives.....	118
FIGURE B-10. Truncations.....	118
FIGURE B-11. Retouched pieces.....	119
FIGURE B-12. Loop handle.....	120
FIGURE B-13. Lug handle on Byblos jar.....	121
FIGURE B-14. Illustration of lug handle on Byblos jar.....	121
FIGURE B-15. Decorated Pottery - Red Painted and Red Slipped/Painted.....	122
FIGURE B-16. Decorated Pottery - Wide Painted Lines.....	122
FIGURE B-17. Decorated Pottery - Incised and Burnished.....	123
FIGURE B-18. Decorated Pottery - White Slipped.....	123

LIST OF TABLES

TABLE 3.1. Chronology of the Neolithic period.....	18
TABLE 5.1. Absolute frequency of debitage classes.....	56
TABLE 5.2. Relative frequency of debitage classes.....	57
TABLE 5.3. Proportion of lithics from excavated units.....	57
TABLE 5.4. Relative frequency of flakes, blades and bladelets.....	59
TABLE 5.5. Relative and Absolute Core frequencies.....	60
TABLE 5.6. Absolute frequencies of formed tool.....	61
TABLE 5.7. Relative frequencies of formed tools.....	61
TABLE 5.8. Absolute frequency of burin types.....	65
TABLE 5.9. Relative frequency of burin types.....	66
TABLE 5.10. Absolute and Relative frequencies of burins at selected LN sites.....	67
TABLE 5.11. Absolute counts of denticulates.....	68
TABLE 5.12. Relative counts of Denticulates.....	68
TABLE 5.13. Absolute frequencies of the subdivisions of the multiple tools class.....	70
TABLE 5.14. Absolute and Relative frequencies of notches	71
TABLE 5.15. Absolute and relative frequency of notches at selected LN sites.....	71
TABLE 5.16. Absolute frequency of scrapers.....	72
TABLE 5.17. Absolute frequency of scrapers.....	72
TABLE 5.18. Relative and Absolute frequencies of sickles at selected LN sites.....	74
TABLE 5.19. Absolute and relative frequencies of truncations.....	76
TABLE 5.20. Absolute and relative frequency of retouched pieces subtypes.....	77
TABLE 5.21. The relative frequency of retouched pieces subtypes.....	77
TABLE 5.22. Absolute and relative frequency of utilized pieces subtypes.....	78
TABLE 5.23. Absolute and relative frequencies of sherds and ware types.....	84
TABLE 5.24. Absolute frequency of decoration types.....	87

CHAPTER 1 INTRODUCTION

1.1 INTRODUCTION

In the 2001 season of the Wadi ath-Thamad Project, the Wadi ath-Thamad survey team recorded the presence of Late Neolithic occupations at two adjacent sites, Umm Meshrat I and II (Figure 1.1). A subsequent surface survey of the sites was carried out. The results of the surface collection prompted further investigation of the sites during which seven test probes were excavated, five at Umm Meshrat I and two at Umm Meshrat II. This thesis examines the chipped stone and pottery collections from the surface survey and preliminary test probes at Umm Meshrat I and II.

The Wadi ath-Thamad survey is a component of the Wadi ath-Thamad Project, which began in 1995 and continues under the direction of Dr. Michèle Daviau of Wilfrid Laurier University. The focus of the project is the excavation of Khirbat al-Mudayna, a fortified Iron Age town with a six-chambered gate and associated casemate wall system (Daviau 2000a: 1). Subsidiary endeavors of the Wadi ath-Thamad Project include the excavation of a Roman/Nabataean villa and reservoir located at the foot of Khirbat al-Mudayna, the excavation of WT 13, an Iron Age shrine site, and the Wadi ath-Thamad Regional Survey (WTRS).

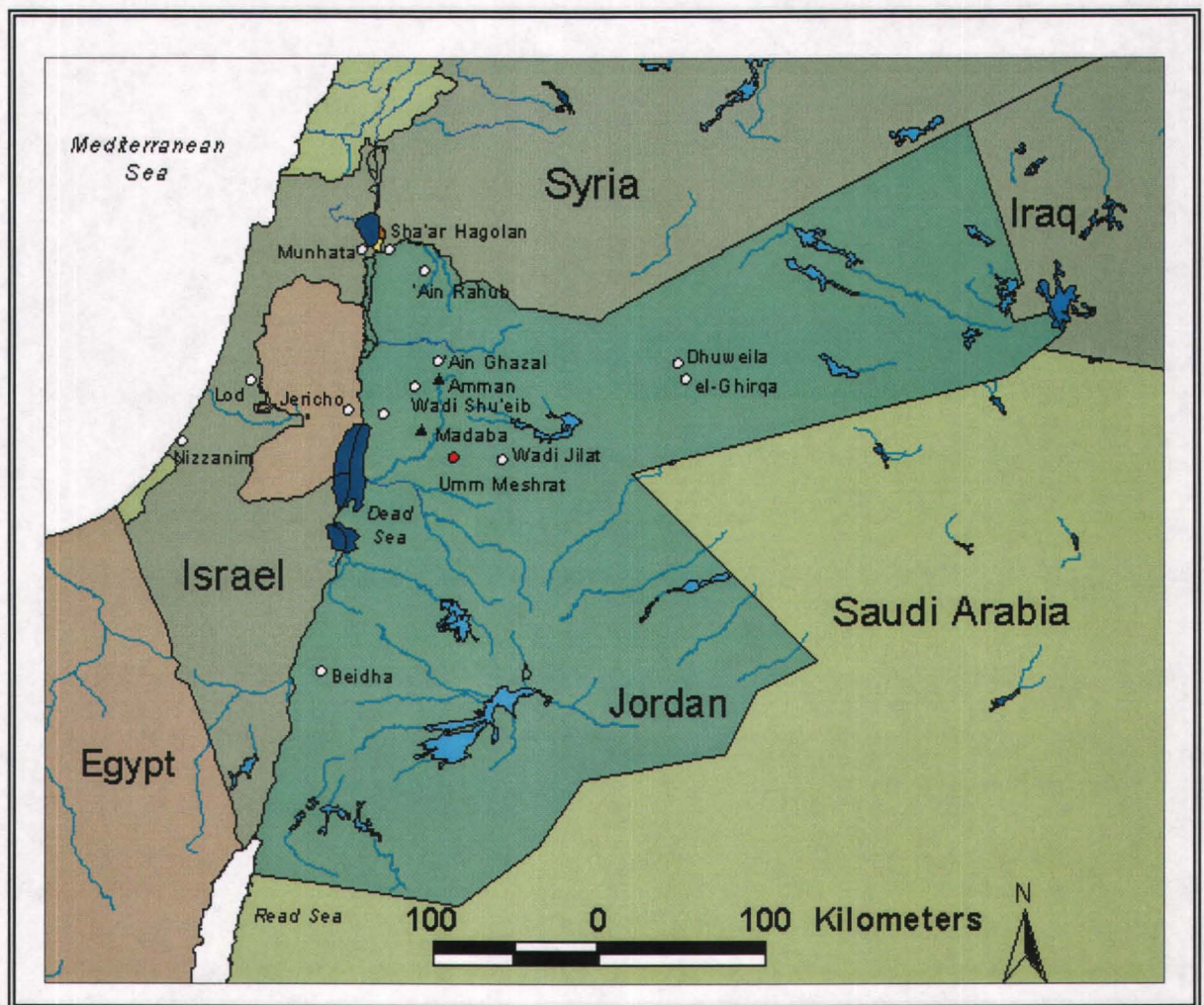


FIGURE 1.1. Location of Umm Meshrat.

The WTRS began in 1996 as a small project to identify the major Roman and Iron Age sites in the area (Daviau 1997: 225, Daviau 2000b: 281). Andrew Dearman directed the survey during the 1996 and 1997 seasons. In 1998, Dr. Chris Foley of the University of Saskatchewan became the director of the WTRS. Since the directorial change, the goals of the WTRS have shifted to include the identification prehistoric sites. Currently, the aim of the WTRS is to determine the multi-occupational history of the region by (1) identifying all archaeological sites; (2) accurately recording the location of each site; and (3) performing systematic collection of artifacts from each site. This process will establish a chronology of the occupation of the area and provide data for a regional analysis of settlement pattern and spatial distribution. Particular interests of the WTRS include the identification of road networks (WT 64, WT 70, WT 75), watch towers (Rujum al-Heri, Rumeil, and Zafran), and Epipaleolithic (WT 40 and WT 67) and Neolithic sites including Umm Meshrat I and II.

The Wadi ath-Thamad survey area was occupied from the Lower Paleolithic to recent times with the exception of an apparent hiatus during the Bronze Age. Most of the sites in the survey area belong to the Middle Paleolithic (WT 83), Epipaleolithic (WT 40 and WT 67), Neolithic (WT 72), Iron Age (Khirbat al-Mudyana), and Roman Period (Az-Zona). During the 1996 to 2001 seasons, 102 sites were recorded.

1.2 RESEARCH GOALS

Initial interpretations of the pottery and lithic artifacts at Umm Meshrat I suggested the site was Yarmoukian, a tradition of the Late Neolithic period. This observation is significant because it would mark the most southerly location where Yarmoukian pottery is attested. Umm Meshrat II, although located just upslope from Umm Meshrat I, demonstrated an appreciably different lithic collection from Umm Meshrat I, with high

frequencies of burins. The site was initially designated a burin site; however, pottery was recovered during the excavations of the test probes. This find was important because pottery has not been identified at a burin site in Jordan.

This thesis will explore the validity of these initial interpretations through the analysis of the lithic and pottery assemblages. Additional objectives of this thesis are threefold. The first goal of this thesis is to determine if a relationship exists between the surface collected material and the material collected during the excavation of the probes. It is necessary to establish if the surface collected material is related to the excavated material because at this stage of the research most of the artifacts were recovered from the surface survey as opposed to excavated contexts. If it can be established that the surface and excavated material are homogeneous, suggesting the collections represent the same occupation, then information can be drawn from both collections, rather than from only the excavated material.

The second objective of this research is to determine if there are similarities between the collections at Umm Meshrat I and II. Because the sites are located so close to each other, it is easy for us to assume that the sites must be related to each other. Given the long occupational history of the Wadi ath-Thamad survey area it is reasonable, however, to suppose that the sites were occupied at different times by different groups of people. Comparisons between the collections from Umm Meshrat I and II may clarify this issue.

The third goal of this thesis is to identify if the material from Umm Meshrat I and II is analogous to any known site and if so, if the material remains are indicative of a particular tradition. This last research goal is vital to this project and all other Late Neolithic archaeological projects in the southern Levant because it puts the individual site into the broader regional context. It is important to consider what is going on beyond Umm

Meshrat I and II for several reasons. The research at Umm Meshrat I and II is preliminary and, at the present, only deals with the lithic and pottery collections. Many other Late Neolithic sites in Israel and Jordan have been excavated successfully and all collections including lithics, pottery, flora, fauna have been analyzed and published. Comparisons between these data sets may indicate how Umm Meshrat I and II fit into the broader regional trends. In the absence of absolute dates from each site, relative dating through seriation of the lithic and pottery collections from Umm Meshrat I and II may indicate close temporal occupations of the sites. In addition, typological comparisons with sites of recognized traditions could indicate the affiliation of Umm Meshrat I and II.

Umm Meshrat I and II have the potential to be very important for Late Neolithic research. If one or both sites are determined to belong to the Jericho IX tradition, it would greatly increase the current knowledge about this tradition. Currently less than 10 Jericho IX sites have been identified (Garfinkel 1999b: 10). If the sites are determined to be Yarmoukian, it would be the furthest south that a Yarmoukian campsite(s) has been identified. In addition, the Yarmoukian tradition has only been identified at some 20 Late Neolithic sites (Garfinkel 1999b: 10). Regardless of the identification of their tradition, any information gained from the analysis from Umm Meshrat I and II will add significantly to the body of Late Neolithic research.

1.3 CHAPTER SUMMARY

This thesis is composed of six chapters. Chapter Two is a description of the present and past environments of the Wadi ath-Thamad survey area. Included in the chapter are discussions of the present climate, vegetation, soils and geomorphology, as well as the paleoenvironmental conditions just prior to, and during the occupation of Umm

Meshrat I and II. Chapter Three is a detailed description of the Late Neolithic period. This chapter addresses the problem of Neolithic terminology and introduces the current views on settlement patterns and subsistence strategies leading up to and including the period. The bulk of the chapter is an overview of the Late Neolithic material culture. This discussion is important for establishing the cultural trajectories of Umm Meshrat I and II. Chapter Three also serves to illustrate the difficulties in the identification of traditions in the Late Neolithic period. Chapter Four presents descriptions of the sites, methodology employed during the surface survey and preliminary excavations at the sites and the excavation units. This chapter sets the stage for the analysis of the artifacts to which Chapter Five is devoted. Chapter Five is a detailed account of the lithic and pottery collections from Umm Meshrat I and II. The chapter discusses the typology used for the analyses as well as the results. The data from each collection, represented through type frequencies, is examined at several levels in order to fulfill the research objectives. Chapter Six provides a summary of the results of the lithic and pottery analysis from Umm Meshrat I and II and considers how these results relate to the objectives of this thesis. A discussion regarding future research in the area is provided.

CHAPTER 2

THE WADI ATH-THAMAD SURVEY AREA: PRESENT AND PAST ENVIRONMENTS

2.1 PRESENT ENVIRONMENT

The WTP survey area is located approximately 20 kilometers southeast of Madaba, Jordan (Figure 2.1). It is situated in a transitional zone between the desert to the east and the Transjordan Plateau to the west. The topography is characterized by gently sloping hills that have been dissected by erosion to produce valleys, terraces, and wadis. The drainage network consists of five main wadis or seasonal streams: Wadi ath-Thamad, Wadi Shabik, Wadi Zafaran, and Wadi Rumeil (Figure 2.2). All of these wadis drain into Wadi el-Wala, which, in turn, drains into the Wadi Mujib and into the Dead Sea.

The WTP survey area is located in the Irano-Turanian environmental zone. Irano-Turanian environments receive between 200 mm and 350 mm of precipitation annually (Horowitz 1979: 31, Zohary 1962: 131). Between 200 mm and 250 mm of precipitation is recorded annually in the survey area, decreasing from west to east (Cordova 1999a: 2). The precipitation falls in short, strong events during the winter months. The Irano-Turanian environment has extremes of cold winters and hot dry summers (Horowitz 1979: 31). Based on a 30-year average, the mean daily temperatures for Madaba, located 20 km northeast of the study area, are 23 °C for July and 8 °C for January (Ferguson and Hudson 1986: 17).

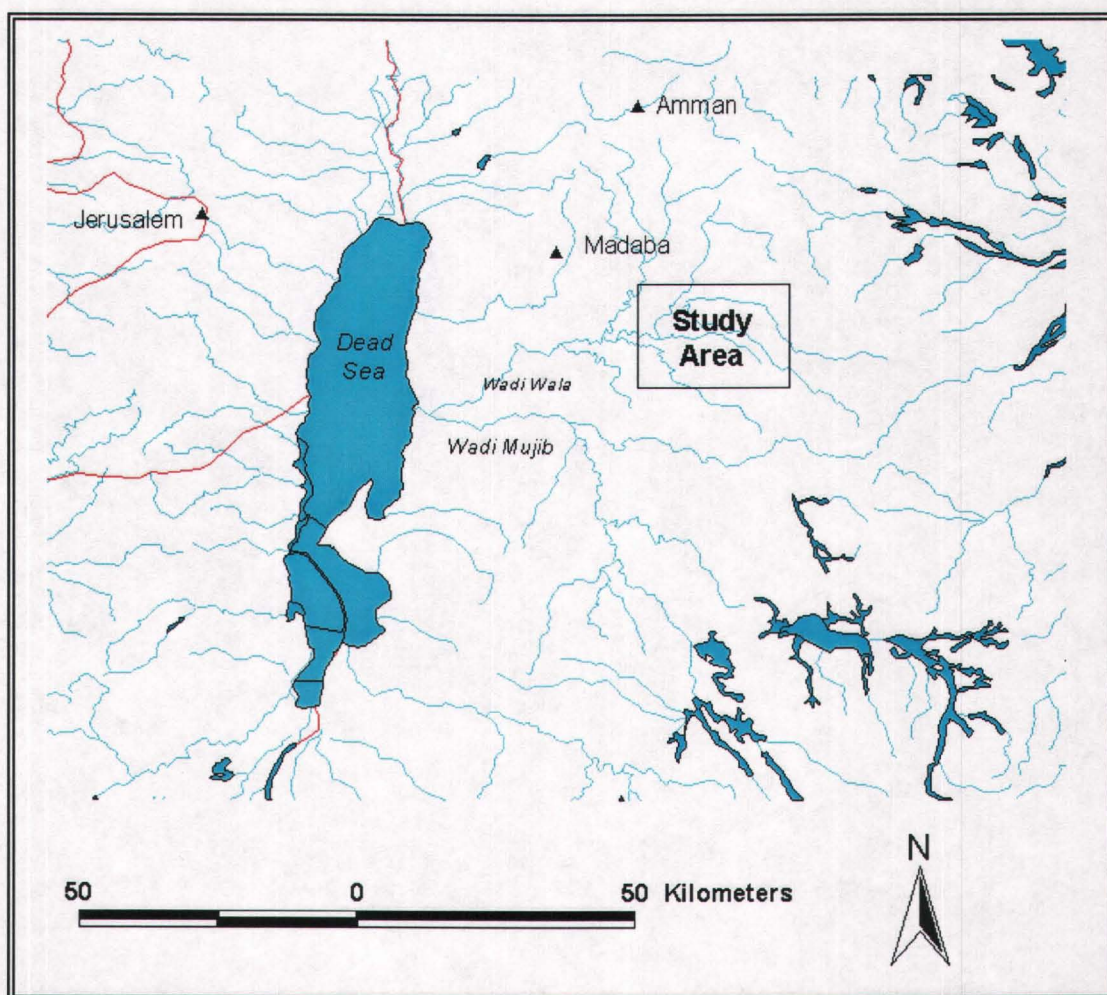


FIGURE 2.1. Location of the Wadi ath-Thamad Survey area.

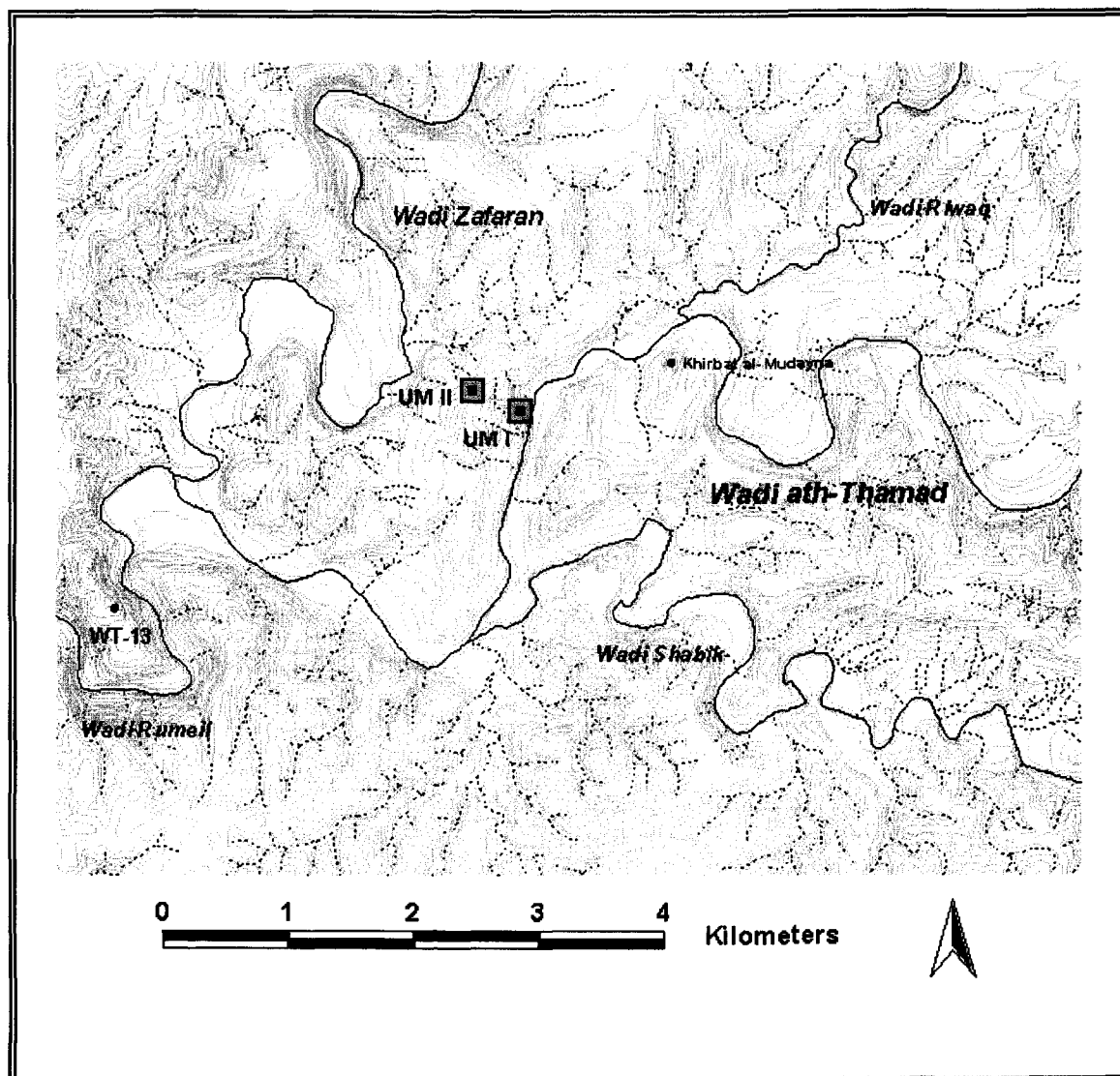


FIGURE 2.2. The Wadi ath-Thamad Survey area.

Steppe vegetation is predominant in the study area. Zohary (1962: 128-132) defines steppe vegetation as lacking arboreal vegetation, but with relatively continuous vegetation cover consisting of brushwoods, dwarf-shrubs, and a few drought-resistant shrubs all categorized under the class *Artemisietea herbae-albae*. In the WTP survey area, the vegetation is very sparse during the summer months; however, riparian vegetation is common and consists mainly of *Nerim oleander*. Oleander is particularly dense in Wadi ath-Thamad.

Moorman (1959 in Cordova 1999b: 191) classified the soil types in eastern Jordan as: red Mediterranean, which are highly fertile but very susceptible to erosion; yellow Mediterranean soils, which are thinner and occupy areas of higher slope; and yellow soils, which are the poorly developed soils of the steppes and slopes. Unlike the red Mediterranean soils that predominate in the Madaba area (Lacelle 1986: 46), yellow Mediterranean and yellow soils are dominant within the study area (Cordova 1999b: 192). Both soils have high clay and little organic content and are the result of the weathering of limestone. According to Lacelle (1986: 53), yellow soils are weakly developed and have a lower threshold of water retention than is typical of the red Mediterranean soil, which are differentiated from *Terra rosa* on the basis that they are commonly calcareous to the surface (Lacelle 1986: 45-46). The hilltops in the study area frequently have areas of exposed limestone and shallow deposits of yellow desert soil. Extensive erosion has occurred, in part, due to the combination of weakly developed soils, sparse vegetation, and low precipitation that falls in intense events.

In the study area, the Zerqa-Ma'in strike-slip fault, ath-Thamad structure (a normal fault), and the Rumeil Fault produce the ath-Thamad graben (Al-Hunjal 1995: 31). This graben decreases the stream gradient, thereby increasing deposition (Cordova 2000: 544). Incision of these deposits lead to the formation of terraces. While most wadis in the study

area exhibit terraces, the upper terraces along the Wadi ath-Thamad are of particular importance to this thesis because Umm Meshrat I is situated on top of one (Figure 2.3).

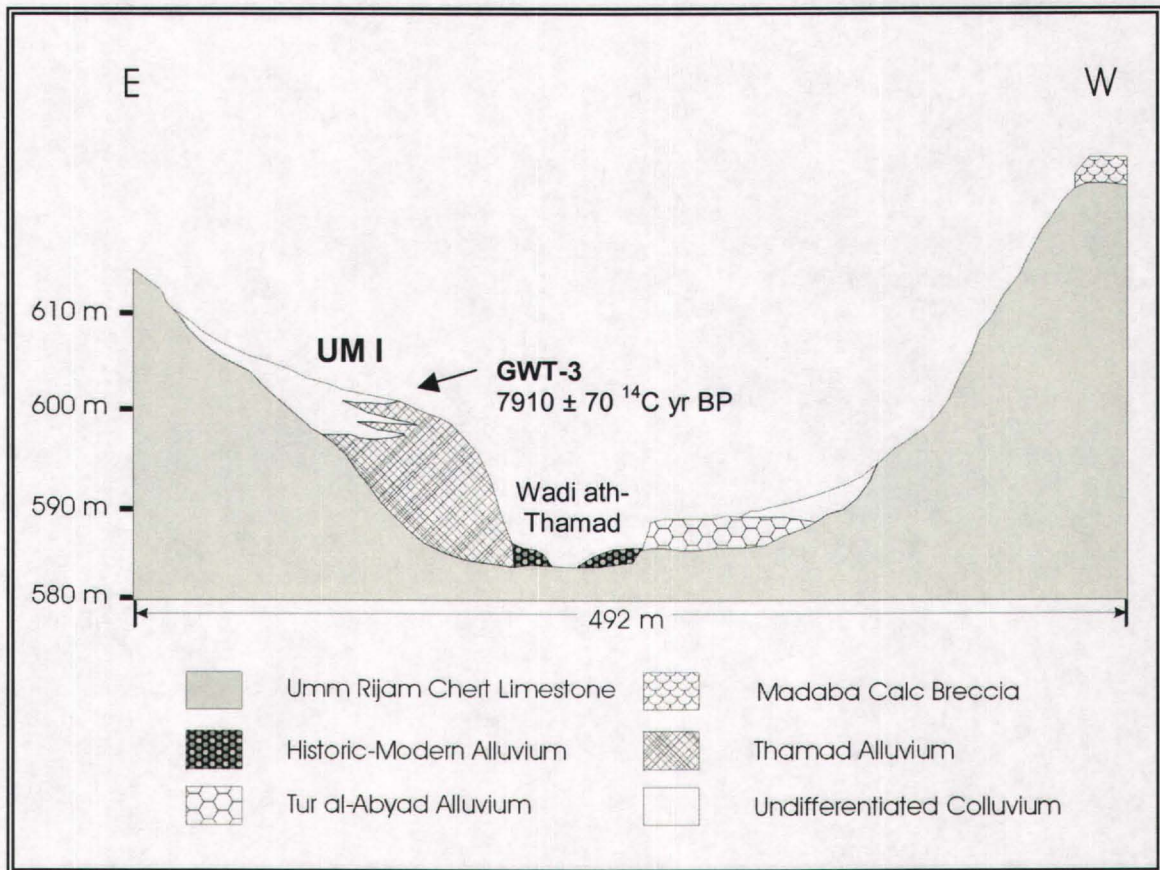


FIGURE 2.3. Section on the Wadi ath-Thamad terraces. UM I is located on the upper terrace on the left. Note the more recent lower terrace on the right of the wadi. (after Cordova 2000: 550)

The upper terraces are approximately 10 to 25 m above the modern wadi bed and are composed of the Thamad and Dalala units (Cordova 2000: 549) (Figure 2.4). The following description of the upper terraces is summarized from Cordova (2000: 549-550). The Dalala unit is approximately 2 meters thick on average and lies directly over the erosional surface of Umm ar-Rijam Chert Limestone. This unit is topped by Dalala soil

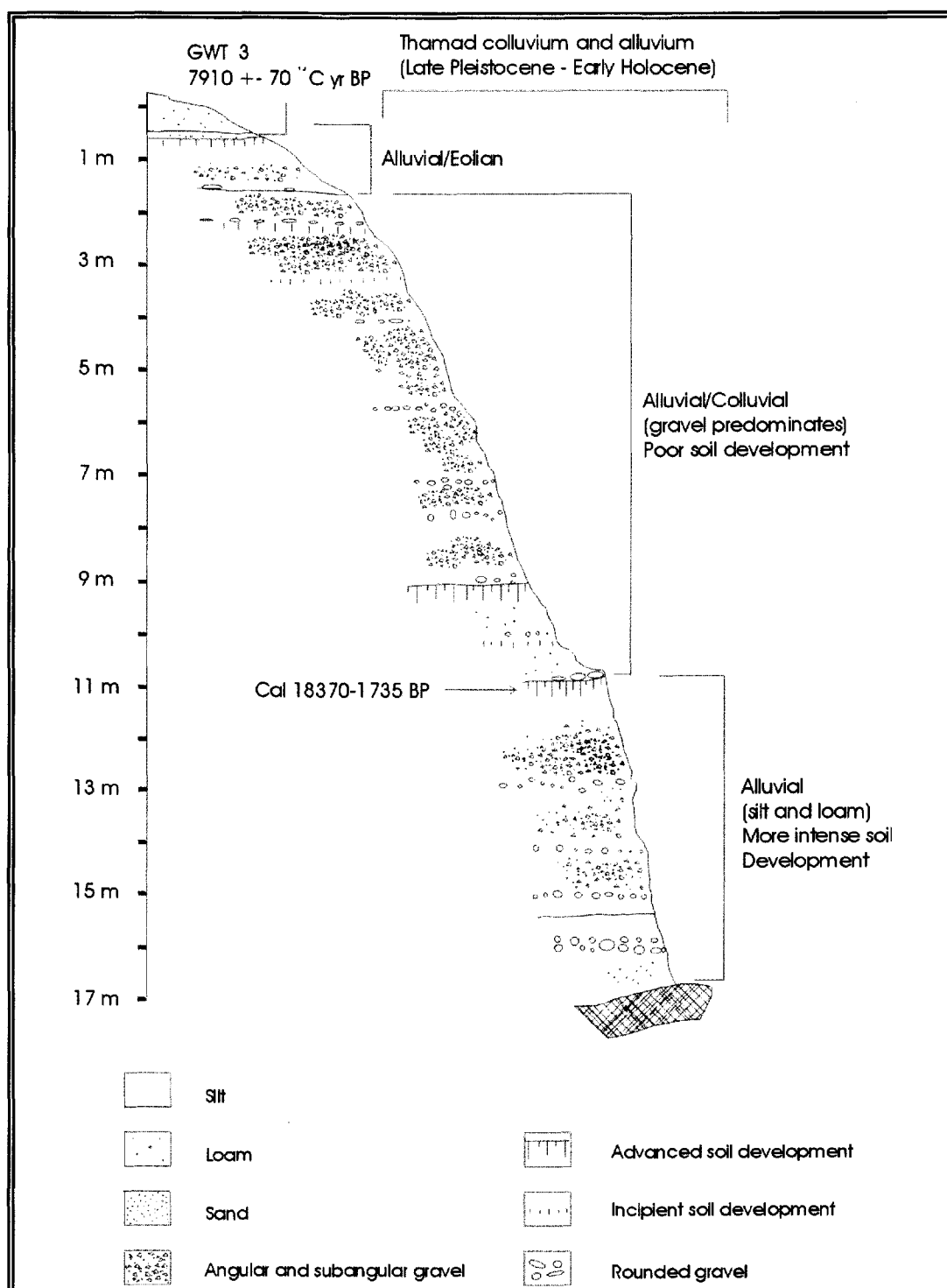


FIGURE 2.4. Section drawing of the upper terrace at UM I (after Carlos Cordova, personal communication 2002)

and, based on archaeological material, this horizon likely was deposited prior to 17,000 years BP. The Thamad unit overlies the Dalala soil and largely consists of fine reddish-brown silts with cumulic soils. This deposit is interbedded with rounded gravel and poorly sorted colluvium. A deposit of colluvium caps the colluvial deposit. One radiocarbon date (7910 ± 70 ^{14}C yr BP) was obtained from near the top of the deposit (Figure 2.3). According to Cordova (1999b: 194), incision occurred during the early Holocene and this process lead to the formation of the upper terrace.

Cordova (1999a; 1999b; 2000), however, does not refer to the presence of the colluvial debris field observed in the 2001 survey season at Umm Meshrat I. This unit is composed of fist-sized cobbles and forms a fan-shape that terminates approximately 10 meters from the eastern edge of the terrace. Similar deposits have been recorded at numerous Yarmoukian sites including Wadi Shu'eib (Simmons et al. 2001: 4-7), Ain Rahub, and Jebel Abu Thawwab (Kafafi 1993: 102-103) and dates approximately to 7500 BP (Gary Rollefson, personal communication 2001).

2.2 PALEOENVIRONMENT

A great deal of paleoenvironmental research has been done in the southern Levant including the work of Horowitz (1979), Baruch and Bottema (1991), Bottema and Van Zeist (1981) and Goldberg (1981). The majority of this research has focused on the Quaternary rather than the Holocene. The general consensus is that dry conditions prevailed during the late Natufian (12,500-10,500 BP) followed by a brief moist period during the Early Neolithic between 9000 BP and 8500 BP and a return to dry conditions (Henry 1986: 11-12, Goldberg 1981: 65; Shehadeh 1985: 27, Bottema 1987: 300; Butzer 1975: 393). The beginning and duration of the moist phase is debatable and some argue

that it begins as early as 10,500 BP (Bottema 1987: 300). Because very little paleoenvironmental research has focused on the Late Neolithic and the research that has been done covers a broad area, regional paleoenvironmental indicators also must be considered.

In the Wadi ath-Thamad survey area, the presence of red Mediterranean soils in the Thamad Units indicates a humid environment during the early Epipaleolithic period, as these soils only develop in areas with semi-humid and humid environments. This corresponds to a similar occurrence in the Azaraq Basin where there is a moist phase between 24,000 BP and 15,000 BP (Byrd and Garrard 1990). Vegetation in a Mediterranean environment differs significantly from the Irano-Turanian environment, which is currently experienced in the Wadi ath-Thamad survey area. In modern Mediterranean environments, there is an increased number of plant and animal species in comparison to Irano-Turanian environments (Horowitz 1979: 29). Mediterranean vegetation is much more lush and climax vegetation includes evergreen forests. It is probable that vegetation in the Wadi ath-Thamad survey area during this humid phase was similar to that in modern Mediterranean environments. The last well-developed B-horizon in the Wadi ath-Thamad deposits dates to $16,120 \pm 50$ ^{14}C BP (Cordova 2000: 561). Erosion of the uplands occurred between 17,000 BP and 9000 BP (Cordova 2000: 561). Interbedding of Thamad alluvium and colluvium is indicative of climatic fluctuations.

According to Cordova, during the early Holocene stream incision formed the upper terraces (Cordova 1999b: 194). Stream incision occurs when there is a low sediment load in runoff either during a period when vegetation stabilizes the hillslopes, decreasing the amount of sediment that enters the stream through runoff or there is little sediment on the hillslope (i.e. exposed bedrock). Thus, sediment is eroded from the stream channel rather

than from the hillslopes. It is likely that during the early Holocene there was a period of increased humidity, which persisted long enough to allow vegetation to establish itself and incision by the streams to occur. This coincides with the belief that there was a brief moist phase during the early Neolithic. Cordova (1999b: 195) suggests that incision did not end until the Chalcolithic period (6500 BP to 5200 BP).

To summarize, the paleoenvironmental record from the Wadi ath-Thamad survey area appears to follow the general trend observed throughout the southern Levant during the early Holocene. Dry conditions prevailed during the late Epipaleolithic period, followed by a phase of humid conditions during the Early Neolithic. Drier conditions followed with minor fluctuations.

CHAPTER 3

BACKGROUND RESEARCH ON THE LATE NEOLITHIC PERIOD

3.1 INTRODUCTION TO THE LATE NEOLITHIC PERIOD

The Late Neolithic (henceforth LN) period spans approximately from 7,600 BP to 7,000 BP and succeeds the Pre-Pottery Neolithic period (henceforth PPN). The LN period has long been recognized through large-scale projects such as the excavations at Jericho (Kenyon 1957) and Sha'ar Hagolan (Stekelis 1951). In the past two decades, interest in the LN period has stirred with the excavations of such sites as 'Ain Ghazal (Rollefson and Simmons 1986) and Wadi Shu'eib (Kafafi et al. 1993). Consequently, these recent excavations have made it necessary to reevaluate and solidify the classification scheme. This process is well under way with such work as pottery (Garfinkel 1999a) and projectile point (Gopher 1994) analyses. Nevertheless, a great deal of work must follow, including the excavation of more sites, reanalysis of excavated sites, and a thorough examination of LN lithic assemblages. This work would make it simpler to identify LN sites as well as the industries within the period. The following is a summary of the material culture of the LN period in the southern Levant.

3.2 LATE NEOLITHIC TERMINOLOGY

Terminology is always a subject of contention in archaeology. This is a particular problem in the LN as there has been a plethora of classification schemes for the period. On a primary level, researchers do not even agree on the name: is it Late Neolithic (Banning 1998; Kafafi 1990) or Pottery Neolithic (Garfinkel 1999a; Rollefson et al. 1989; Simmons et al. 2001)? This problem is exacerbated by the use of 'type-site' chronologies whereby a culture is defined by the artifacts found at these sites. As Rollefson (1996: 220) notes "the events that transpire at one or two settlements need not reflect the general pattern of human settlement in a give region. In other words, the 'type-site' deserves a perhaps respectful but necessary death." In effect, the inadequacy of type-site chronology is demonstrated by the abundance of LN terminology. The LN period has been divided and subdivided into numerous categories including Yarmoukian, Jericho IX, Lodian, Sha'ar Hagolani, Wadi Rabah, PNA, PNB, Néolithique ancien, Néolithique moyen, and Néolithique récent (Banning 1998: 188,190; Garfinkel 1999a:2-3).

Until a single classification scheme is accepted, I will adopt the LN terminology established by Garfinkel (1999a), whereby the LN period consists of one phase with three contemporary ceramic traditions: Yarmoukian Ware, Jericho IX Ware, and Nizzanim Ware (Garfinkel 1999a: 6). Garfinkel (1999a) avoids the use of the term 'industry' and opts for the term 'tradition' when referring to similar pottery assemblages. Gopher (1994) defines an industry as representing "a group of assemblages of similar technology and typology that originate in habitation units spread over a well-defined area, existing during a known period of time." At this point in LN research, it is preemptive to suggest that Yarmoukian and Jericho IX are unique industries, although it is likely that this eventually will be established. While Garfinkel (1999a) suggests that the LN pottery traditions are contemporary, this has

not been confirmed. However, this classification scheme does not imply a hierarchical order to Yarmoukian and Jericho IX traditions. Conversely, Banning (1998: 191) characterizes Yarmoukian as an industry of the LN complex with Jericho IX and Coastal Neolithic as facies. This suggests that Jericho IX and Coastal Neolithic are derivatives of Yarmoukian. It has not been established if either Yarmoukian or Jericho IX precedes one another or if they are contemporary (see Garfinkel 1999b; Gopher 1995). Therefore, it best to not make assumptions at this time. In contrast to Garfinkel's (1999a) terminology, I will use the term 'Late Neolithic' rather than 'Pottery Neolithic.' This avoids confusion with the PPN.

<i>Period</i>	YEARS BP
PPNA	10,500 – 9200
PPNB	9200 – 8100
PPNC	8100 – 7600
LN	7600 – 7000

TABLE 3.1. Chronology of the Neolithic period (after Garfinkel 1999b: 2)

Garfinkel (1999a: 2) does not include Wadi Rabah in the LN period. Both Garfinkel (1999a) and Banning (2001) recognize that the decision to categorize Wadi Rabah as either LN or Chalcolithic is an arbitrary decision because, as Banning (2001: 80) notes, "there is a cultural continuum from one to the other, and Wadi Rabah assemblages have traits in common for both."

Garfinkel's (1999a) LN terminology does not include 'Burin Neolithic' sites. This is likely due to the fact that Garfinkel's terminology hinges on the pottery traditions and most burin sites and LN stations have no pottery. These sites do not represent an individual industry, but rather a particular type of site (Alison Betts, personal communication 2002).

For the purpose of this thesis I will use Betts' (1992) definition of burin sites and LN stations, as she has published the majority of work on the subject after recording 82 burin sites in the Eastern Desert. Rollefson (1988, 1995; Rollefson and Frolich 1982; Rollefson and Kaechele 1982) has also done a great deal of work on burin sites. While both McCartney and Betts' (1998) and Rollefson's (1988, 1995) terminology is basically the same, Rollefson does not deal with the classification of burin sites and stations as does Betts (1992).

3.3 SETTLEMENT PATTERNS AND SUBSISTENCE DURING THE LATE NEOLITHIC

Settlement patterns are varied throughout the Neolithic period. The PPNA period (ca. 10,500-9600 BP) appears to be a continuation of the Natufian period, demonstrating a movement towards increased sedentism (Rollefson 1992: 123-124). By approximately 9200 BP the typical PPNB sites, including Jericho, Beidha, and 'Ain Ghazal, were established (Rollefson 1992: 123). Sites ranged from small sites, such as Beidha, Ghwair I, Nahal Oren, and Tell Ramad, to larger villages of approximately 4 hectares, including Tel Abu Hureyra, Beisamoun, Jericho, and 'Ain Ghazal (Simmons 2000: 213). Population in the area expanded, likely as the result of successful cereal agriculture and goat herding (Rollefson 1992: 123).

Settlement patterns shifted dramatically during the late PPNB (ca. 6500 – 6000 BP). Many established sites, such as Jericho, Beidha, Munhata, were abandoned in favor of rural locals (Rollefson 1992: 124; Rollefson and Köhler-Rollefson 1992: 24). New sites were established in areas previously uninhabited. Simmons (2000: 215) suggests that this may be attributed to natural and culturally induced environmental changes. Some sites in west-central Jordan, such as 'Ain Ghazal continued to be inhabited (Rollefson 1992: 124).

Interestingly, 'Ain Ghazal and other newly established sites, such as Wadi Shu'eib, Beisamoun, Basta (Rollefson 1989: 169) and Ba'ja (Gebel and Beinert 1997), became very large, up to 14 hectares in size (Rollefson 1992: 124). There is no archaeological evidence to explain this phenomena and it is unlikely that climatic factors, alone, were responsible (Rollefson 1992: 124). By 8000 BP, the growth of these villages stopped and "as had been witnessed on a smaller scale some 500 years earlier, farming villages and towns were once again deserted on a grand scale, including *all* of the known PPNB sites in Palestine" (Rollefson 1992: 124).

A different picture emerged in west-central Jordan with the excavation of 'Ain Ghazal and Wadi Shu'eib where continuous occupations, although with smaller total populations than in the PPNB period, are recorded through the PPNC and LN periods (Rollefson and Kafafi 1994: 15; Simmons et al. 2001). Simmons (2000: 215) suggests that this population aggregation is a "desert-edge adaptation...[that] may have been linked to ecological changes and the depletion of local environments." In more arid areas including the Eastern Desert, another adaptation is marked by the appearance of burin sites and LN stations.

Most scholars (Banning 1995: 4-5; Gopher 1995: 207; Rollefson and Simmons 1987b: 44; Rollefson 1996) suggest that the shift in settlement patterns was an adaptation to natural and/or economic forces. Rollefson (1996) elaborates this model by proposing the 'cultural degradation model' where, as the name indicates, cultural practices such as lime production and agriculture degraded the environment to a point where it could not support the population. As a response to climate and/or culturally induced environmental degradation settlement size decreased and many small sites were established in new areas.

Many researchers suggest that within the LN period there are discrete patterns of distribution for each tradition (Garfinkel 1999a; Kafafi 1993, Gopher 1995). Yarmoukian sites tend to be located in the north, ranging from the Sea of Galilee to just north of the Dead Sea (Garfinkel 1999a: 17) (refer to Figure 1.1). Wadi Murabaa'at Cave, which lies south of the Dead Sea, is the one exception to this rule. Jericho IX sites are considered to have a more southerly extent, although there is significant overlap with the Yarmoukian distribution (Garfinkel 1999a: 17). Only two Jericho IX sites are attested east of the Jordan River. Nizzanim sites are all located along the south central Mediterranean coast (Garfinkel 1999a: 17). These patterns of distribution may reflect the small number of sites that have been recorded. Close to 20 Yarmoukian, some ten Jericho IX, and only three Nizzanim sites are attested (Garfinkel 1999a: 17, 1999b: 10). Further research may show that this distribution reflects only the areas investigated, not the true spatial distribution of LN sites.

Just as settlement patterns shift through the Neolithic period, so are there shifts in subsistence strategies. During the PPNA period subsistence strategies included a diverse range of hunted animals and agricultural pursuits. The debate over the first appearance of domesticated cereals continues to be waged (see Banning 1998: 214). It is, however, clear that the use of cereals and legumes with domesticated traits increase throughout the PPN period (Banning 1998: 214). At PPNA Jericho, gazelles constituted nearly 40 % of the total faunal remains, while sheep and goats accounted for less than 10 % of the fauna (Clutton-Brock 1978: 37). The analysis of the faunal remains from PPNA Jericho shows no evidence of domestication (Clutton-Brock 1978: 38). Throughout the PPN period hunting decreased and pastoralism increased, with clear signs of domestication of goats and sheep by the PPNB period (Garfinkel 1993b: 812; Clutton-Brock 1978: 38). The faunal assemblage at Jericho shows a heavy increase in the use of sheep and goats, both of which show evidence

of domestication; up from less than 10 % in the PPNA to nearly 40% in the PPNB (Clutton-Brock 1978: 37).

By the LN period hunting all but disappears and cereals and legumes became the main caloric intake (Banning 1998: 214). Faunal assemblages demonstrate a high reliance on domesticated *ovi-caprids*. This pattern is demonstrated at 'Ain Ghazal where there is an obvious shift from a relatively diverse faunal assemblage in the PPNB with both wild and domesticated fauna to a reliance on domesticated animals during the Yarmoukian occupation of the site. In the PPNB period at 'Ain Ghazal the faunal remains indicate goats were domesticated, but "the hunting of wild animals provided nearly half of the meat consumed during the early parts of the PPNB" (Kholer-Rollefson and Rollefson 1990: 4). In contrast to the PPNB period where *ovi-caprids* constitute 53% of the faunal assemblage, there is an over 70% reliance on *ovi-caprids* during the Yarmoukian occupation (Kholer-Rollefson and Rollefson 1990: 6). This reliance on domesticated sheep and goats during the LN is also attested at Jebel abu-Thawwab where they constitute 68% of the faunal remains (Kafafi 1993: 112).

The LN settlement patterns and subsistence strategies are markedly different than in the early PPN period. There is a general trend towards smaller settlements, as seen with the decreased population at 'Ain Ghazal (Rollefson and Kafafi 1994: 15). Subsistence at LN sites is based on cereal and legume cultivation, as well as pastoralism. These substantial changes are not restricted to settlement patterns and subsistence strategies, but are reflected also in changes in architectural styles, art object and lithic assemblages, and the adoption of pottery.

3.4 MATERIAL CULTURE OF THE LN PERIOD

In Kenyon's (1957: 83) account of the excavations at Jericho, she remarks that "In every respect except the use of pottery, however, this phase is one of retrogression". This statement, although not politically correct because the idea of linear cultural evolution is misleading, is very true. Architecture, lithic technology, and even the art assemblage of the LN are very distinctive from the material culture of the PPNB period. The LN period, however, is most readily defined from the preceding PPN by the appearance of pottery.

3.4.1 *Late Neolithic Architecture*

Throughout the PPNB period there is a high degree of standardization of architecture. Megaron buildings or 'pier houses' are arranged in a linear fashion or are densely clustered (Banning 1998: 219). Compartmentalization increased through the period. The intense use of lime plaster is characteristic of the period (Rollefson and Köhler-Rollefson 1992: 246). Lime plaster signifies a high degree of permanence, as it requires a large labor investment with a resulting product that cannot be carried from place to place. Beginning in the PPNC, there is a divergence from this pattern, although lime plaster continues to be used (Banning 1998: 221). By the LN period, architecture became much less standardized and the use of lime plaster was completely discontinued.

A great deal of variation in architectural styles occurs during the LN period, not only between sites, but at the intrasite level as well. Pit houses and circular structures are most common at LN sites, although rectangular, and apsidal structures are found (Simmons et al. 2001: 8-9; Rollefson and Kafafi 1994: 13-17; Garfinkel 1993a: 127-128; Banning 1998:221). A complete reversal of the compartmentalization trend in the PPNB is seen in LN architecture (Banning 1995: 48). At Munhata five round structures were found along

with over 70 pits, while at Sha'ar Hagolan a massive rectilinear public building was identified alongside a small (1.6 m by 3 m) domestic structure (Garfinkel 1993a: 128). At Jericho a large number of pits, interpreted as either dwellings or quarries for mudbrick material, were identified, as well as a few fragmentary walls (Gopher 1995: 210). According to Gopher (1995: 210), a sunken circular structure constructed of mudbrick and mud was identified. At Jebel abu-Thawwab architectural remains include: rectilinear rooms, apsidal buildings, and one small curvilinear building (Kafafi 1993: 103).

At 'Ain Ghazal, because it appears to have been continuously inhabited, a slightly different pattern in architectural styles exists. During the early Yarmoukian occupation of 'Ain Ghazal, PPN architecture was reused (Rollefson and Kafafi 1994: 14). Although no complete example of a pit house was identified, a beaten earth floor approximately 3 meters in diameter attests to the presence of temporary shelters (Rollefson and Simmons 1987b: 45). LN architecture at 'Ain Ghazal generally consists of rectangular and circular structures (Rollefson and Kafafi 1997: 40-43). In addition, two platform-like features were identified inside a circular structure and are believed to be analogous to stone storage platforms used by modern Bedouin (Rollefson and Kafafi 1994: 17; Banning 1993: 219). Rollefson and Kafafi (1997: 42) also believe that they have identified the postholes of a rectangular *'arisha* shade structure.

While the shape and type of structures at LN sites is highly variable, they all share one common element; they lack lime plaster. Unlike the PPNB period, the use of lime plaster stops completely during the LN (Banning 1998: 221; Rollefson and Khöler-Rollefson 1992: 251). Rollefson and Khöler-Rollefson (1992: 251) suggested this occurred because of competition for fuel. Wood that had been used to generate the high temperatures needed to produce lime plaster was required for pottery production. Because

the local environment could not support both industries, the choice was made to produce pottery at the expense of lime plaster production.

The architectural changes implemented by LN populations are presumably responses to the shifts in settlement strategy and subsistence. Decreased architectural standardization is evident at many LN sites including Jericho, 'Ain Ghazal, and Jebel abu-Thawwab. Settlements, such as 'Ain Ghazal, demonstrate a trend towards smaller sites. In addition, lime plaster technology is set aside to allow for the development of pottery.

3.4.2 *Late Neolithic Art Objects*

Art has a longstanding presence in the Neolithic and includes plastered skulls (Kenyon 1957: 60; Rollefson 2000: 169-170), lime plaster statues and busts (Rollefson 2000: 171-172; Waker-Tubb and Grissom 1995; Bartlet 1983: 54), as well as fertility and animal figurines (Kenyon 1957: 59-60; Rollefson 2000: 167-168). In the LN there is a shift away from representational art to more symbolic styles. LN art objects generally are associated with Yarmoukian assemblages (Garfinkel 1993b: 812). Two types of art objects are common: (1) incised stones and (2) clay figurines (Figure 3.1).

Gopher and Orrelle (1995: 222, 1996: 257-261, 267-271) describe the incised pebbles as depicting images of women. They further divide the group into 'women pebbles' that "could represent women of different age groups" and 'vulva pebbles' that "are thought to portray female genitalia at different reproductive stages of development and childbearing" (Gopher and Orrelle 1995: 222). In North American plains archaeology artifacts bearing distinct similarities to the 'vulva pebbles' have been recorded (Flenniken and Ozbun 1988). However, in plains archaeology, these artifacts are labeled grooved abraders and interpreted as "tool making implements used to shape, sharpen and/or dull

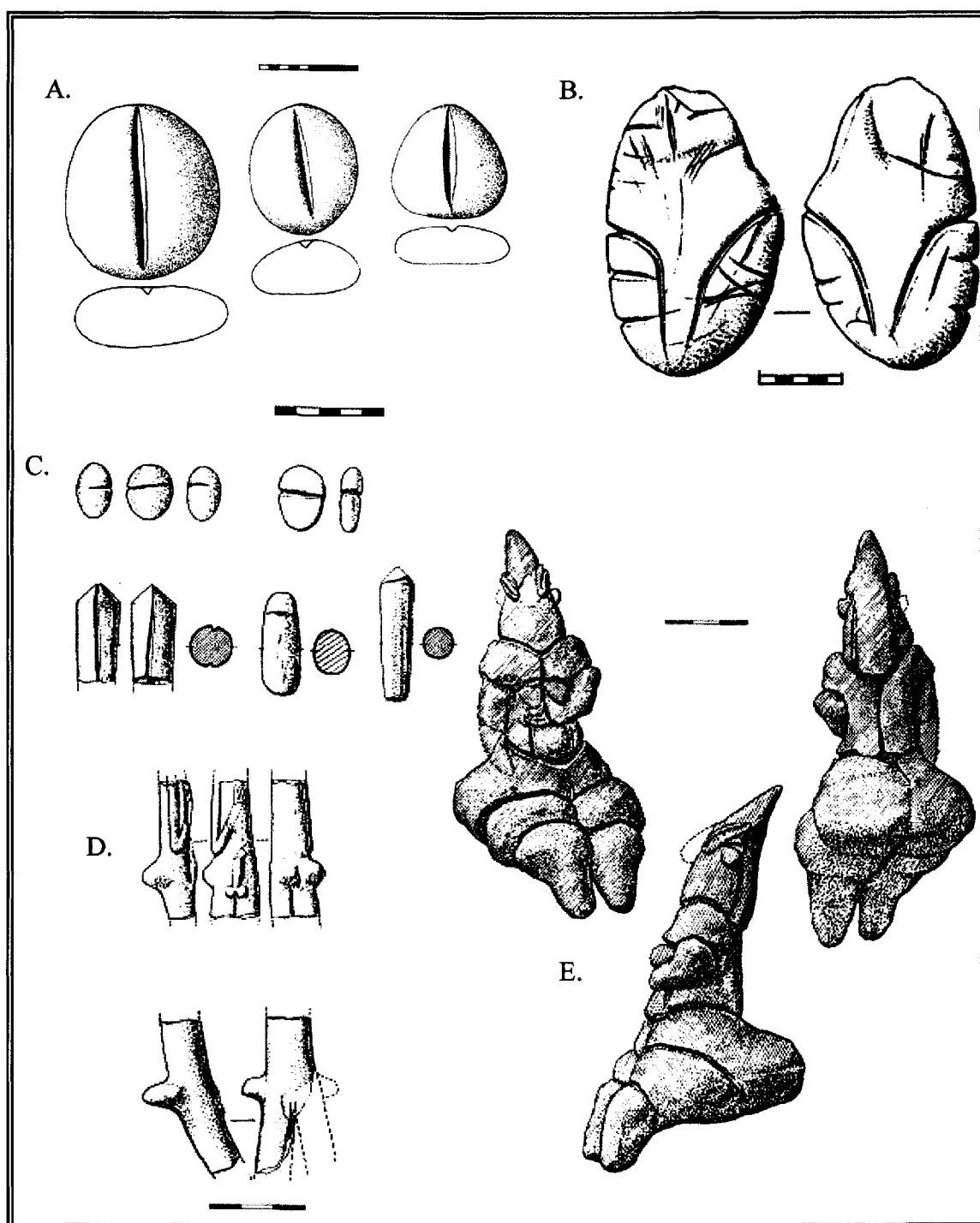


FIGURE 3.1. Art objects: incised pebbles (A-C) including (A) vulva pebbles, (B) women pebbles, (C) phallic symbols; clay figurines (D-E) including (D) male cylindrical figurines, and (E) coffee bean eye figurines (after Gopher and Orelle 1996).

surfaces and edges during tool manufacture and maintenance” (Flenniken and Ozburn 1988: 37). This interpretation is supported through ethnographic examples. While ‘vulva pebbles’ may represent a type of art object, it is possible that like the North American grooved abraders these LN incised pebbles may represent utilitarian items. Stekelis (1972: 54) recorded a number of incised pebble phallic symbols at Sha‘ar Hagolan as well.

Another common and possibly the most distinctive LN art object are the ‘coffee bean’ eye figurines. These clay figurines are highly stylized. In his article, Garfinkel (1993a: 124) reported that 63 ‘coffee bean’ eye figurines were found at the following sites: Megiddo, Habashan Street, Sha‘ar Hagolan, and Munhata. These figurines also have been found at Jebel abu Thawwab in Jordan (Kafafi 1993: 103). While coffee bean eyed figurines usually depict female forms, at least two examples of male figurines were recorded (Garfinkel 1993a: 124). These clay figurines once were considered only characteristic of Yarmoukian assemblages, but one such artifact was identified at Lod, a Jericho IX site (Garfinkel 1999b: 9).

Two other forms of clay figurines are reported at LN sites. Male cylindrical figurines occur in LN assemblages; however, no complete example has been recovered (Garfinkel 1993a: 124). These figurines differ significantly from the ‘coffee bean’ eyed figurines. “The bodies are formed of elongated cylinders to which hands, legs and sex organs are added” (Garfinkel 1993a: 124). Animal figurines were identified at Jebel abu-Thawwab (Kafafi 1988: 466) and Munhata (Garfinkel 1993a: 123). The animal figurines at Jebel abu-Thawwab included the rear portion of what appears to be a bovid, as well as animal phallic symbols (Kafafi 1988: 466).

It is clear that the LN period has a rich assemblage of art-objects. While some sites such as Munhata and Sha‘ar Hagolan have abundant art objects, other LN sites have few or

none (Garfinkel 1993a: 126). Gopher (1995: 218) suggests that this may be related to different research strategies and biases. Nevertheless, one must keep in mind that these artifacts are found differentially among LN sites and large sites like Wadi Shu'eib (Simmons et al. 2001) and 'Ain Ghazal (Rollefson and Simmons 1987a; Rollefson and Kafafi 1997) have yet to produce such objects.

3.4.3 *Chipped Stone Assemblages in the Late Neolithic*

The LN chipped stone assemblage is distinct from PPN lithic assemblages. Several new formed tools appeared during the period. These additions include three small projectile points types and bifacial tile knives (Figure 3.2). Sickles, which emerged in the lithic assemblages of the southern Levant during the Natufian period, remain an important part of the lithic assemblage during the LN. Despite the continuance of particular lithic types like sickles and the introduction of new types, such as small projectile points, perhaps the most interesting difference between PPN and LN lithic assemblages is the transition from blade-dominated assemblages to flake-dominated assemblage (Gopher 1995: 210).

Decreased reliance on blade technology persists throughout the LN, although blades continue to be used for the production of sickles and projectile points (Banning 1998: 203). Declining frequencies of bipolar blade cores and increased proportions of pyramidal or prismatic single-platform cores mirror the shift to a flake dominated industry (Banning 1998: 203; Gopher 1995: 210). Simple, unretouched, and only slightly retouched flakes (expedient tools) make up the bulk of LN lithic assemblages (Banning 1998: 203). Siggers (1997: 24-27) acknowledges that while some researchers feel that the transition to a flake-based assemblage marks the fall of lithic technology, he suggests that this view is

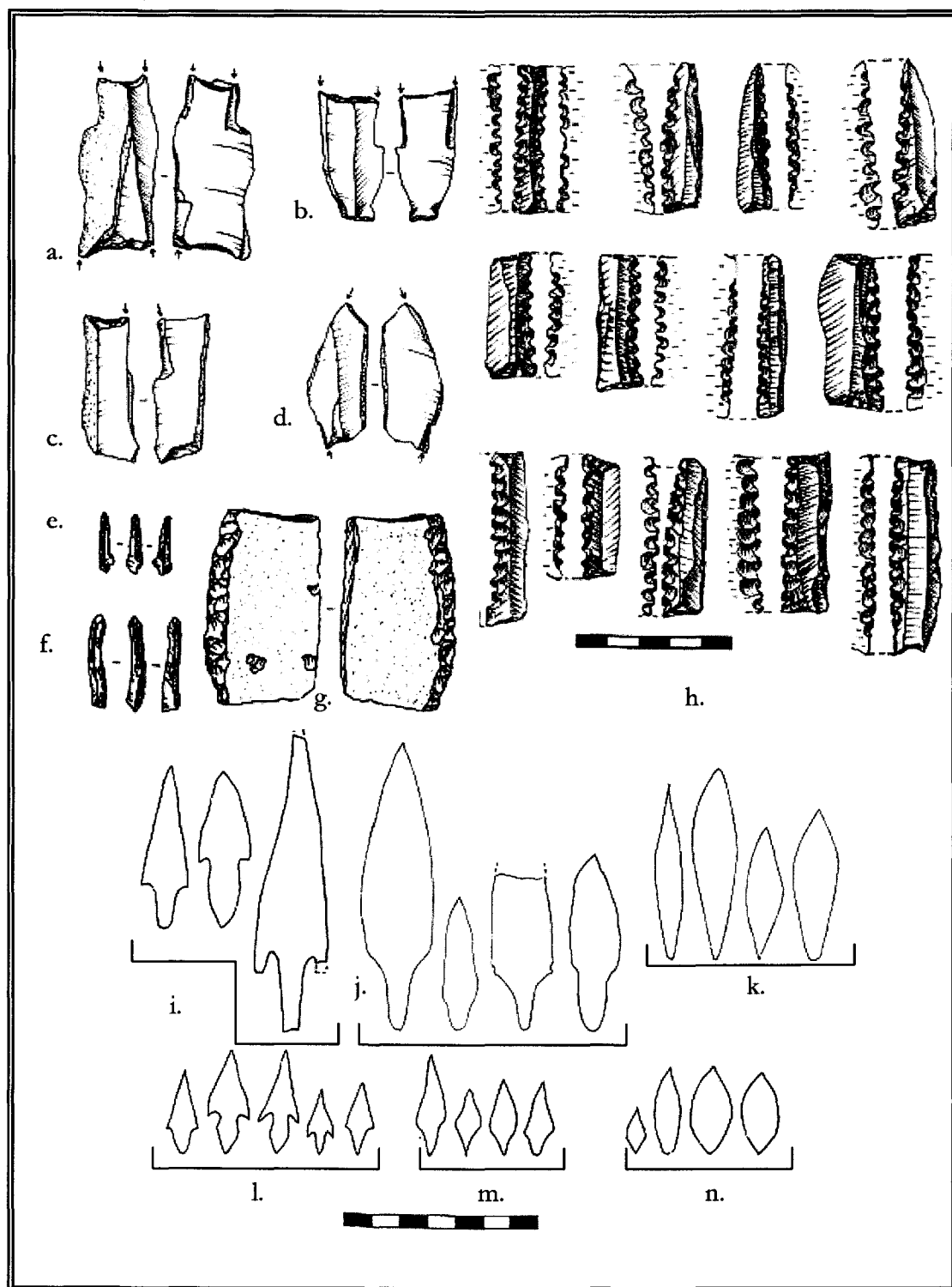


FIGURE 3.2. LN chipped stone tools. Burins (a-d) including (a,c) concave truncation burin, (b) straight truncation burin, (d) dihedral burin; drills on spalls (e, f); tile knife (g) (after Betts 1987); denticulated sickle blades (h) (after Stekelis 1972); and projectile points (i-n) including (i) Jericho points, (j) Byblos points, (k) Amuq points, (l) ha-Parsa points, (m) Nizzanim points, and (n) Herzliya points (after Gopher 1994: 43)

unfounded. In contrast, Siggers (1997: 29) proposes that the shift to a flake-based lithic assemblage is a technological approach that minimizes risk because it takes less time and expertise to produce these tools. Rollefson and Kafafi (1997: 23), however, suggest that the flake to blade ratio is not a reliable means of seriation as it reflects only specific tasks in particular areas.

A number of formalized chipped stone tools types are established or become more frequent in LN assemblages. Notable among these groups are bifacial tools including adzes, picks, and axes, which increase in frequency throughout the period (Banning 1998: 204). Banning (1998: 204) suggests that adzes may have been used to break up soil in preparation for cultivation or to clear brush and trees reflecting the importance of agriculture. The use of polish on such bifacial tools is a trait only adopted in the LN period and carried through the Chalcolithic period (Barkai and Gopher 1999: 314). New types of formalized tools consisting of bifacially shaped flat knives and proto-tabular scrapers appears in the LN period (Gopher 1995: 210).

Projectile points, while usually found in low numbers at LN sites, are a useful means of seriation. In Gopher's (1994) analysis of Neolithic arrowheads, he demonstrated that the LN could be distinguished from the PPN by the appearance of small projectile points. The ha-Parsa, Nizzanim, and Herzliya points are miniature versions of earlier PPN point types such as Jericho, Byblos, and Amuq points (Figure 3.2) (Gopher 1994: 265). Although these small arrowheads are the dominant projectile point type in LN assemblages, the earlier PPN forms also can be found (Gopher 1989: 52). In general, the earlier the assemblage in the LN period, the lower the frequency of small points (Gopher 1989: 53). Throughout the period, the small LN projectile points increase in frequency and the larger PPN projectile points decrease.

There is a great deal of overlap in the sickle blade typology during the PPN, LN, and Chalcolithic periods. However, some distinctions can be recognized. Yarmoukian assemblages are noted for their high proportions of coarsely denticulated sickle blades (Figure 3.2) (Banning 1998: 204; Kafafi 1993: 110; Garfinkel 1993a: 121-123). The sickle elements are usually short, truncated blade segments (Rosen 1997: 138). Denticulations may occur on one or both sides of the sickle (Gopher 1995: 210). In PPN assemblages, sickle elements are usually on long blades without the large denticulations characteristic of Yarmoukian assemblages (Banning 1998: 202), but coarsely denticulated sickle blades have been identified in PPNC (Garfinkel 1999b: 9) and Wadi Rabah assemblages (Barkai and Gopher 1999: 63-65; Banning 1998: 198).

Sickle blades considered typical of Jericho IX lithic assemblages are quite distinctive from the 'characteristic' Yarmoukian ones. Trapezoidal/rectangular sickle blades formed by pressure flaking are considered typical of Jericho IX assemblages (Garfinkel 1999b: 9; Gopher 1995: 211). These sickle blades, while not found at Sha'ar Hagolan, were noted at Yarmoukian sites, including Munhata and Nahal Qanah Cave (Garfinkel 1999b: 9). However, Crowfoot-Payne (1983 in Garfinkel 1993a: 130) identified the Pottery Neolithic A lithic assemblage as Yarmoukian. This clearly indicates a lack of agreement as to what constitutes a Jericho IX or Yarmoukian lithic assemblage and, therefore, the presence or absence of either denticulated or trapezoidal or rectangular pressure flaked sickle blades within an assemblage are not sufficient to indicate a particular LN industry.

As Siggers (1997) noted, the flake dominated LN lithic assemblage does not mark a technological regression as Kenyon (1957) suggests, but rather it marks a preference for expedient tools. There are, however, several tool types that did require a large investment of time as well as practiced execution, including sickle blades, projectile points, and bifacial

knives. LN lithic assemblages also show increased frequencies of bifacial adzes that may reflect a need for more arable land. The energy invested in sickle blade production also suggests they play an important role in the economy, whereas the low frequency of projectile points is indicative of decreased reliance on hunting for subsistence. While chipped stone tools constitute the majority of the artifacts recovered from LN sites, they are over-shadowed by the appearance of pottery because of use in seriation.

3.4.4 *Late Neolithic Pottery*

3.4.4.1 Introduction

The LN is characterized primarily by the appearance of a “relatively sophisticated ceramic tradition” (Banning 1998: 206). Some scholars, including Kenyon (1957: 82), believed the appearance of pottery in the southern Levant to be sudden and attributed the technology to a foreign population. It is very likely that the skills needed to make pottery developed out of the technology used for the production of lime plaster that prevailed during the PPNB period (Garstang and Garstang 1948: 64 in Banning 1998: 206). Excavations at ‘Ain Ghazal clearly demonstrate that the appearance of pottery during the LN originated locally (Kafafi 1995: 545; Kafafi 1992: 116). In PPNB strata at ‘Ain Ghazal, numerous small objects of baked and unbaked clay were recovered (Rollefson and Simmons 1988: 408). In addition, “a substantial sample of sherds of sun-dried ceramics - some coated with red ochre - come from the early PPNB layers, and more than 20 fired sherds from secure, probably mid-7th millennium contexts” (Rollefson and Simmons 1988: 408). White ware, vessels of carved chalk and molded plaster, are attested in several PPNB assemblages, including ‘Ain Ghazal, and are considered characteristic of PPNC assemblages (Garfinkel 1999a: 12-15). These artifacts likely represent the precursor to pottery and in

some cases, such as at Sha'ar Hagolan and 'Ain Ghazal, White ware vessels appear alongside traditional pottery made of clay (Garfinkel 1999a: 13). The presence of both plaster vessels and rudimentary pottery vessels in the PPNB and PPNC periods demonstrate the local development of pottery.

In his analysis of LN ceramics, Garfinkel (1999a: 6) identified “three closely related and contemporaneous ceramic traditions: Yarmoukian Ware, Jericho IX Ware (PNA Jericho), and Nizzanim Ware.” These wares share the following common features as summarized from Garfinkel (1999: 16):

1. all pottery is hand-made;
2. fine and coarse vessels are found side by side;
3. the surface may be wiped and smoothed with grass or straw;
4. some bases bear mat impressions indicating mats were used as working stations;
5. petrographic studies of the assemblages from Munhata and Nahal Qanah Cave indicate that vessels were made of local clay;
6. potters preferred carbonatic clays.

Late Neolithic pottery also shares similar vessel types. Garfinkel (1999a: 20) identified 20 different types of vessels (Appendix A – Figure A-2). The distinguishing element of Late Neolithic pottery is the decoration; however, decorated sherds generally constitute a small portion of the total LN pottery assemblage. Only 12.8 % of the sherds at Munhata and 15.4 % of the sherds at Sha'ar Hagolan are decorated and no statistics are available for the frequency of decorated sherds from LN Jericho (Garfinkel 1999a: 59, 75).

3.4.4.2 Yarmoukian Ware

Yarmoukian pottery was found at numerous sites throughout north-central Israel and Jordan, extending as far north as Horvat 'Uza (Garfinkel 1999a: 17). Yarmoukian decoration includes red slip, wide painted lines (Figure 3.3a), narrow painted lines, incised herring-bone pattern, incised parallel lines or frames, and other incised decoration (Garfinkel 1999a: 59-63). Incised decoration is the characteristic element of Yarmoukian pottery, in particular, Sha'ar Hagolan decoration (Figure 3.3c) (Stekelis 1951: 13; Garfinkel 1999a: 64-67; Gopher 1995: 210).

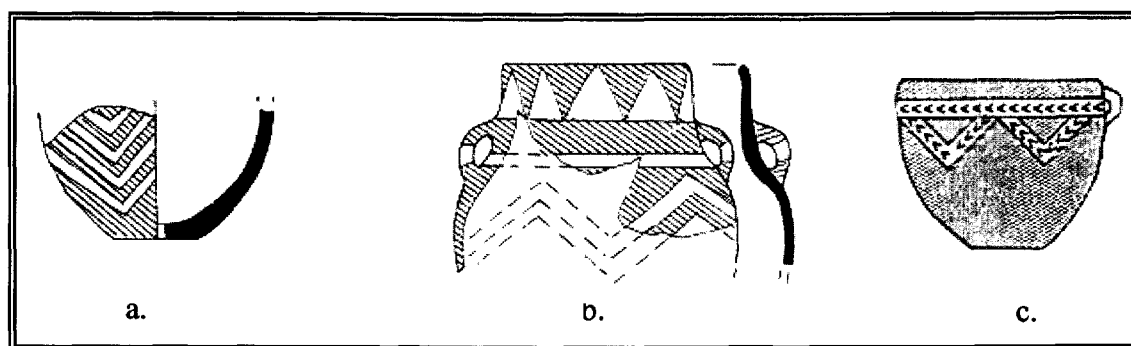


FIGURE 3.3. Examples of LN pottery decoration techniques including (a) wide painted lines), (b) various painted designs including the triangle motif, (c) Sha'ar Hagolan decoration (after Garfinkel 1999a: 88, 64).

While Sha'ar Hagolan decoration is considered typical of Yarmoukian assemblages, it makes up less than half of the decorated sherds from both Sha'ar Hagolan and Munhata (Garfinkel 1999a: 61). Sha'ar Hagolan decoration, as described by Garfinkel (1999a: 64-67), includes a combination of the following decorative elements: horizontal lines, zigzag lines, and herring-bone pattern. First parallel horizontal lines were incised around the vessel, usually close to the rim of a bowl or around the neck of a jar. Second, parallel zigzag lines were incised under the parallel horizontal lines. Third, the frames created in the preceding

steps were filled with incised herring-bone pattern. Lastly, areas not incised were painted red. Numerous variations of Sha'ar Hagolan decoration are noted within Yarmoukian assemblages.

3.4.4.3 Jericho IX Ware

Jericho IX pottery is found throughout south-central Israel and Jordan. The following is a summary of Garfinkel's (1999a: 95) discussion of Jericho IX decoration. Decoration includes slip, burnishing, painted decorations, and incision. Both red and pale slips occur in Jericho IX assemblages, but pale-slipped items are also decorated with painted and burnished patterns. Occasionally red-slipped Jericho IX jars are also burnished. Painted decorations are characteristic of Jericho IX wares. The painting may appear over pale slip and can be burnished. This decoration technique of red painted designs over cream slip does not appear in Yarmoukian assemblages. Incised decorations exhibit the same motifs as found on Yarmoukian pottery. "No quantitative data are available on the frequencies of each category [of decoration]" (Garfinkel 1999a: 95).

3.4.4.4 Nizzanim Ware

Nizzanim Ware is known from a few sites along the southern coastal plain of Israel (Garfinkel 1999a: 97). Decoration includes red slip, painted items (two sherds), incision (one sherd), and burnish (Garfinkel 1999a: 99). Burnishing only appears on red slip, as opposed to Jericho IX pottery where burnished painted patterns predominate (Garfinkel 1999a: 99). Like in Yarmoukian assemblages, the frequency of decorated pottery appears to

be low, although Garfinkel (1999a) neglected to produce any quantitative data regarding this data.

3.4.4.5 Discussion

LN ceramics share many similar attributes and only a few elements distinguish these traditions; however, there is a great deal of overlap between traditions. The design elements characteristic of the Yarmoukian tradition, such as incised lines, are also found in the Jericho IX and Nizzanim traditions. The typical Jericho IX red painted design over a pale slip has been attested at the Yarmoukian site of 'Ain Ghazal (Kafafi 1995: 546). Because of this overlap, LN researchers must be cognisant that while the presence of these decorated sherds in an assemblage may indicate or suggest a particular tradition, they are not *fossiles directeurs*. This situation is exacerbated in small assemblage with sherds that exhibit decoration found in each tradition. In this situation it is almost impossible to conclusively identify tradition.

The relationship of Yarmoukian, Jericho IX, and Nizzanim pottery traditions is not fully understood. While today's consensus that these traditions are contemporary, this can only be established when the sites are sufficiently dated. Further excavation and research may yet demonstrate that the present divisions of the LN period are manufactured by archaeologists. These possible relationships, or lack thereof, may be established by the reanalysis of past excavations, future excavations, or a combination of these efforts. However, Garfinkel's (1999a) concise description of LN ceramics will provide a useful reference that should increase the level of consistency of the analysis of LN sites.

3.4.5 *Burin Sites and Stations in the Late Neolithic*

Burin sites are aptly named as the lithic assemblages collected from these sites have high proportions of burins, primarily on concave truncations. Waechter and Seton Willimas recorded the first burin site, Wadi Dhobai B (also known as Wadi Jilat), in 1938 (Betts 1989: 227). Diagnostic elements including bipolar cores and Byblos points, collected from this site indicated a PPNB occupation (Betts 1989: 227). Because of the relative dating of this site through comparative typology, all burin sites were generally regarded as PPNB. Recent excavations suggest, however, that the dating of Wadi Dhobai B may be anomalous (Betts 1989: 228). In addition, point types known only from the LN period have been found at several burin sites (Betts 1989: 228; Betts and Helms 1987: 328; Betts 1992: 111). Betts (1992: 111) suggests the possibility that burin sites originated during the Pre-Pottery Neolithic B period and continued throughout the Late Neolithic.

While many LN sites, such as 'Ain Ghazal and Wadi Shu'eib, have burin-rich chipped stone assemblages (Rollefson 1995: 517; Simmons et al. 2001: 11), burin sites are distinguished by lithic assemblages composed of 60 % to 80 % burins (Betts and Helms 1987: 328). These sites are generally temporary campsites with little depth of occupation despite high densities of lithics (Betts 1987: 229). Crude flake scrapers, bifacial pieces including tile knives, and occasionally Late Neolithic points are found in burin site assemblages (Betts 1982: 27). Sickle blades and ground stone implements are infrequent (Betts 1982: 30). Pottery has not been recorded at these sites. The lack of pottery is probably an adaptation to arid environments, where the resources, namely firewood, do not exist for pottery firing.

Most burins from burin sites show no evidence of use-wear (Finlayson and Betts 1990: 15-16). This fact, in addition to the preponderance of burins with multiple removals

from multiple points on the burin, suggests that the burins were used as cores from which burin spalls were produced (Finlayson and Betts 1990: 13). This theory is supported by the abundance of drill bits on burin spalls recovered from burin sites (Finlayson and Betts 1990: 13; Betts 1992: 111; Betts 1987: 228). Beads, bead blanks, wasters and raw material, such as soft stone and Dabbah marble, are found frequently at burin sites (Betts 1988: 384).

A number of sites have been recorded that, while having high proportions of burins, have a more diverse lithic assemblage and substantial architecture. In response to these sites, Betts (1992: 112) redefined burin sites as “sites with few or no structures and a tool assemblage consisting almost exclusively of concave truncation burins. Sites with substantial structures and toolkits with truncation burins in a mixed chipped stone assemblage including diagnostic artifacts will be referred to as Late Neolithic stations.” According to Betts (1992: 113), Late Neolithic stations “are so far restricted to the Harra.” Such sites include Burqu’ and al-Ghirqa (Betts 1992: 113). These sites may represent congregations of pastoralists near a reliable water source and grazing land during the summer months (Betts 1992: 113).

Late Neolithic stations show regular re-occupation, possibly on a seasonal basis, and may be occupied for longer durations than burin sites (Betts 1992: 113). This results in a more diverse lithic assemblage. The assemblage from al-Ghirqa (Betts and Helms 1987: 330-333) includes arrowheads, burins, bifaces, scrapers, borers, drills, notch/denticulates, sickle blades, and retouched pieces. Burins remain the dominant tool class in the assemblage and within this class concave truncation burins predominate. In addition to a varied lithic assemblage, ground stone tools are found more frequently at Late Neolithic stations than at burin sites (Betts 1992: 113). Structures include a variety of circular and sub-circular structures including dwellings and corrals (Betts and Helms 1987: 328-330).

Burin sites are found throughout Jordan, Syria, and Saudi Arabia (Betts 1987: 227; Rollefson and Frölich 1982: 189). These sites are usually found in steppic or arid environments (Garrard et al. 1987: 7) and it has even been suggested that burin sites represent a Neolithic adaptation to the desert (Rollefson 1988: 437). Burin sites, however, have also been found in Jordan's highlands, including in Amman (Rollefson and Frölich 1982: 189). Rollefson (1995: 517) notes that burins tend to be found at sites with pastoral economies, rather than at farming communities as demonstrated by the lack or rarity of burins at Jericho and Jebel abu-Thawwab. Both archaeological and ethnographic evidence suggests that pastoralists occupied burin sites and LN stations.

The virtual absence of arrowheads and lack of wild fauna indicate that hunting was not a significant part of the subsistence activities at the site. The location of Jebel Naja and the other sites of the same type also imply pastoralist activities. The sites are selected for their sheltered location, protected from the prevailing westerly wind. They overlook open areas where grazing would be available and animal movement simple. This choice of site location for pastoralist activities is underlined by the fact that these sites have been repeatedly re-used by sheep/goat herding Beduin up to the present day. [Betts 2003]

In addition, architectural remains at al-Ghirqa include structures that are believed to be corrals. Sickle elements and ground stone tools, found in relatively low proportions at LN stations, suggest an economy not reliant on agriculture (Betts 1987: 228). Low quantities of ash and faunal remains may indicate a dependence on live animals (Betts 1987: 29, 2002 personal communication.).

3.5 DISCUSSION

The LN is a period of complexity and diversity, with a material culture very different from the PPN period. While there appears to be an abandonment of many sites at the end of the PPN, a handful of sites in west-central Jordan indicate continuous occupation from the late PPN to LN periods. During this same time, sites with lithic

assemblages dominated by burins are found primarily in the arid regions of Jordan. Architecture at LN sites is extremely variable and ranges from simple pit dwellings to rectilinear structures. The established usage of lime plaster is discontinued as ceramics were introduced. The LN ceramic tradition is likely the most widely recognized innovation of the period. New elements were introduced into the lithic assemblage including the appearance of small projectile points, bifacial knives and increased frequencies of adzes. In addition, the trend of coarsely denticulated sickle elements that began in the PPNC period continued into the LN period. Although debates remain about the industries or sub-groups of the period, it is clear that the LN has a unique and identifiable material culture.

CHAPTER 4

UMM MESHRAT I AND II: SITE DESCRIPTION, METHODOLOGY, AND EXCAVATION UNITS

4.1 SITE DESCRIPTION

4.1.1 Umm Meshrat I

Umm Meshrat I is located 1.5 km southeast of Khirbat al-Mudayna on an upper terrace on the western bank of Wadi ath-Thamad (Figure 4.1). The closest water source is a spring located in the wadi just below the site (Figure 4.2). Local Bedouin continue to use this spring for domestic and agricultural purposes. An alluvial plain lies east of Umm Meshrat and currently is used for agriculture.

The terrace UM I is located on was at one time part of a large terrace that ran along the western bank of Wadi ath-Thamad (Figure 4.4). This terrace, subject to gully incision since deposition, is left in sections. Umm Meshrat is located on the northern most section of the terrace. The terrace section, on which UM I is located, is incised on the south by a gully creating an exposure in which the cultural deposit is visible. The top of the alluvial sequence of the terrace dates to 7910 ± 70 BP (Cordova 2000: 549).

A colluvial layer of fist-sized cobbles seals the Late Neolithic deposit. As mentioned in Chapter 2, this deposit was not identified in Cordova's reports (1999a, 1999b, 2000). The debris field is fan-shaped and terminates approximately 10 meters from the

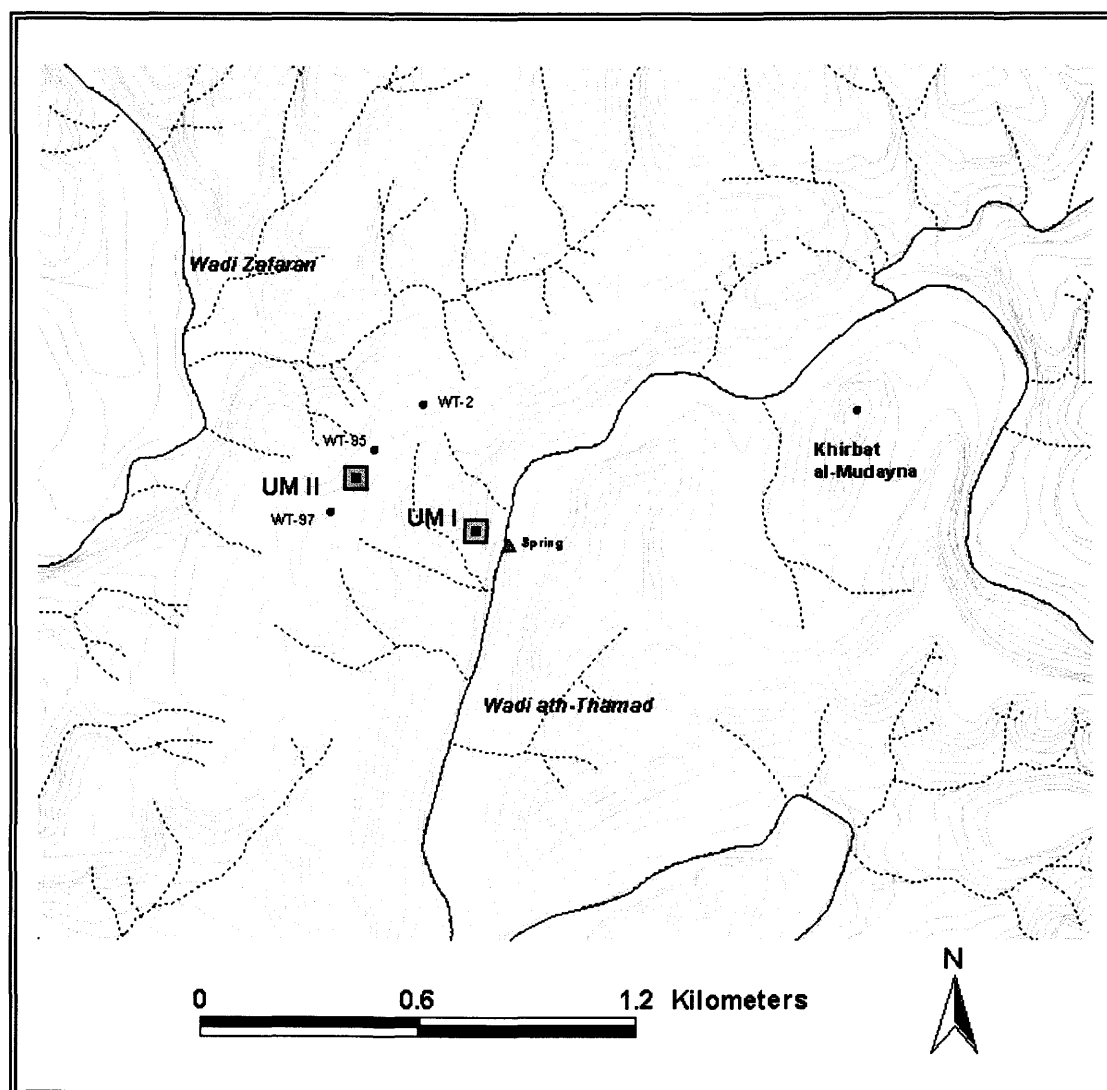


FIGURE 4.1. The location of UM I and II and immediate area.

eastern edge of the terrace. Similar colluvial deposits are found at numerous Yarmoukian sites including Wadi Shu'eib (Simmons et al. 2001: 4-7), Ain Rahub, and Jebel Abu Thawwab (Kafafi 1993: 102-103). Rollefson (2001 personal communication) noted, however, that the debris field at UM I is unique because it lies on the surface of the site, instead of buried by additional colluvial deposits. The debris field is relatively dated to approximately 7500 BP (Gary Rollefson, personal communication 2001). Thus, the LN occupation of Umm Meshrat I occurs early in the Late Neolithic period.



FIGURE 4.2. 'Ain Thamad – spring located just below Umm Meshrat I.

The cultural deposit differs significantly from the alluvial and colluvial terrace deposits. It is very fine-grained, ashy, grey, moderately loose, and has few cobbles. Late Neolithic pottery and lithics were observed eroding from the exposure and a sample was collected from this area. The eastern and southeastern edges of the terrace have suffered extensive erosion and are deflated. Surface scatters of lithics characteristic of the Natufian

culture are relatively frequent in this area. An *in situ* Natufian deposit may remain under the Yarmoukian deposit that was preserved by the debris layer.

Except for a small cemetery occupying the southeast corner of the terrace, little disturbance has occurred at the site. The burials, demarked by either a head stone or an oval ring of stones, are relatively modern. Local Bedouin continue to cultivate the terraces to the south of UM I, but the gully south of the site makes it impossible to reach this terrace by vehicular transport. This impedes the cultivation of the terrace using modern techniques and, therefore, the site remains relatively intact.

4.1.2 Umm Mesbrat II

The survey team recorded UM II during the investigation of the area surrounding UM I. The site is located upslope and southwest of UM I on a ridge that overlooks Wadi ath-Thamad to the east and Wadi Zafaran to the west (Figure 4.1). Site WT 2, an Iron Age watch tower, is north of the site, as is site WT 95, a lithic scatter that may be a continuation of Umm Meshrat II. Site WT 97 lies south of UM II and consists of a large rectilinear structure that is possibly related to UM II. A road providing access to a Bedouin village and to Khirbat al-Mudayna runs north-south through the site. The major concentration of artifacts and features is situated east of the road.

The site consists of a dense lithic scatter, at least 21 circular structures constructed of limestone boulders (Figure 4.3), and a large cairn. The concentration of the surface lithics increases up to the structures and sharply decreases inside the structures. Initial surface collections produced large numbers of burins and the base of a ha-Parsa point, which is characteristic of the LN period. The survey team also observed what appear to be fragments of several rectilinear structures.

Local Bedouin occupied the site in past survey seasons. In the 2001 survey season the Bedouin family inhabited an area approximately 100 meters away from the site, thus allowing for the first investigation of the area by the survey. Despite the modern occupation and the fact that a large portion of the site is deflated, it appears that there has been little disturbance to the position of the artifacts in most areas. There is little sediment on the hilltop and bedrock is exposed in some areas.

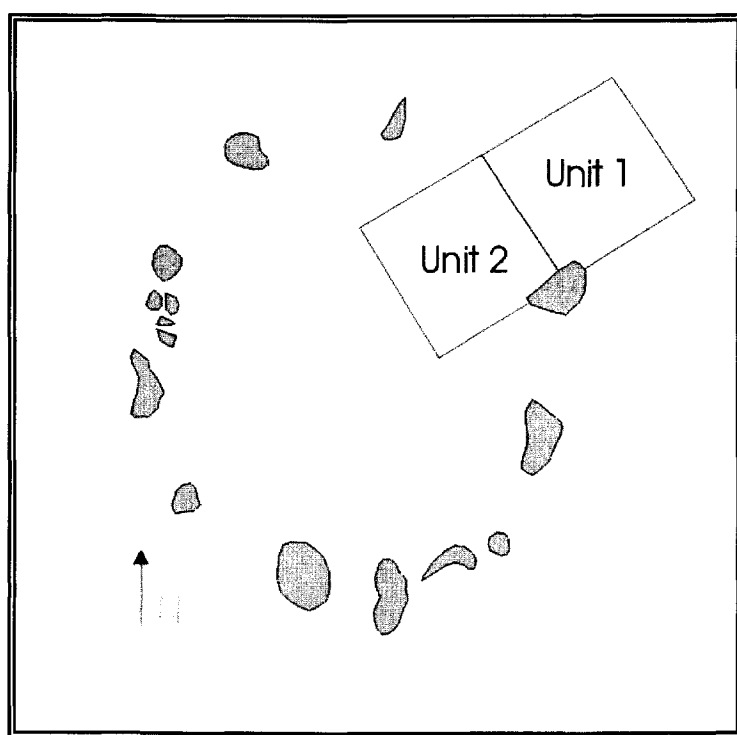


FIGURE 4.3. Example of the circular structures at UM II.

4.2 METHODOLOGY

Prior to excavations at UM I and II, the 2001 WTP survey team collected surface artifacts for approximately four person hours at UM I and one person hour at UM II. The survey team used a judgemental collection technique, whereby the survey team members collected artifacts without the use of a grid or transects for a specified period of time.

Although systematic and random collection techniques provide a greater degree of control over the data they require more time and labor investments. With judgemental collections, one must keep in mind the 'pretty piece syndrome' where it is more likely that easily recognizable artifacts (brightly colored, obvious man-made shapes, etc.) will be collected. Because UM I and II were identified late in the survey season, a judgemental surface collection technique was chosen to allow more time for the excavation of test probes. Surface collection at UM I also took place in the 1998 and 1999 field seasons.

The survey team performed preliminary excavations at Umm Meshrat I and II using the methodology employed by the Wadi ath-Thamad Project at Khirbat al-Mudayna (Daviau 1995). It was the objective of these investigations to establish the nature of the remains at UM I and II and determine if the sites warranted further excavation.

The survey team excavated 1 m² test probes using a locus system. The WTP used 6 m² units for the excavation of Khirbat al-Mudayna, but sampling at UM I and II required the use of smaller units. Rather than establish an overall grid at the site, the survey placed units purposively in areas that showed potential for yielding appropriate artifact samples. The exploration of the Late Neolithic remains at UM I and II occurred very late in the 2001 survey season, which created time constraints limiting the number of test probes and the depths reached in each probe. The survey team screened all excavated sediment using a ¼ inch mesh, with the exception of Units 1 and 2 at UM I where the finding of microliths necessitated the use of 1 mm mesh. Each unit was manually backfilled.

4.3 EXCAVATION UNITS

4.3.2 *Umm Meshrat I*

The WTP survey team excavated five units at UM I during the 2001 survey season (Figure 4.4). Umm Meshrat I was first recorded in 1998 as survey site 40. The survey team noted a concentration of characteristic Natufian artifacts, including lunates, along the southern and eastern edges of the terrace. Surface collection occurred during the initial recording of the site, as well as in the 1999, and 2001 survey seasons. Two units were excavated in 2001 to determine if an *in situ* Natufian cultural deposit was present. Along the southern edge of the terrace where the gully-cut exposed a grey ash deposit, the team observed and collected samples of pottery, lithics, bone, and fire-cracked rock eroding from the immediate area. These artifacts suggested a Late Neolithic occupation. The survey team placed Unit 3 just upslope from the clearest exposure of the ash deposit to determine if an *in situ* occupational layer was present. Thus far, test excavations indicate that the Late Neolithic remains are confined to a grey ash layer.



FIGURE 4.4. Umm Meshrat I with approximate locations of Units 1, 2, 3, and 4.

The excavation of Unit 1 reached a depth of 1.11 meters. The excavation showed neither differentiated stratigraphy nor evidence of a cultural deposit. Numerous artifacts were collected including lithics, a notched wadi pebble, and a cowrie shell. Because this unit showed no connection with the Late Neolithic deposits, it will not be used for the purposes of this thesis.

In an attempt to determine the extent of the Natufian remains at UM I, the survey team placed Unit 2 further upslope from Unit 1 near the center of the terrace. This area is markedly different from the terrace edge because it is in the debris field. Medium-sized cobbles mixed with yellow sediment cover the area, in contrast to the terraces edges where occasional cobbles are on darker, reddish soil. In addition, the concentration of surface lithics decreases to the west and center of the terrace. This phenomenon coincides with the position of the debris field that covers the alluvial deposit with which the Natufian material is associated.

Excavation in this unit reached a depth of 0.25 meters before encountering the debris layer. At the time of the excavation of this unit the survey team did not recognize the significance of the debris layer, nor the likelihood of *in situ* Late Neolithic remains just below it. Excavations ceased upon encountering the layer of fist-sized cobbles and the focus of the excavation turned to Unit 1. The excavation in Unit 2 did not identify an occupational layer. However, the unit yielded numerous lithics in colluvial sediments. The artifacts collected from this unit are excluded from this analysis because the subsequent excavation of Unit 3 demonstrated that the LN deposit is below the debris field. As all artifacts from Unit 2 were collected from above the debris layer they clearly come from a context unrelated to the Late Neolithic remains at UM I.

The excavation in Unit 3 reached a depth of 0.70 meters. The excavation exposed a puddled mud floor (Locus 13) that sealed against two rudimentary wall sections (Loci 11 and 12) constructed of undressed cobbles (Figure 4.5). Artifacts collected from this unit include two pieces of pottery, numerous lithics, and burned bone. The presence of fire-cracked limestone was noted. Of particular interest among the artifacts are one piece of pottery found on the puddled mud floor and the base of a Ha-parsa point. Time constraints did not permit further excavations to determine the full depth of the archaeological remains.

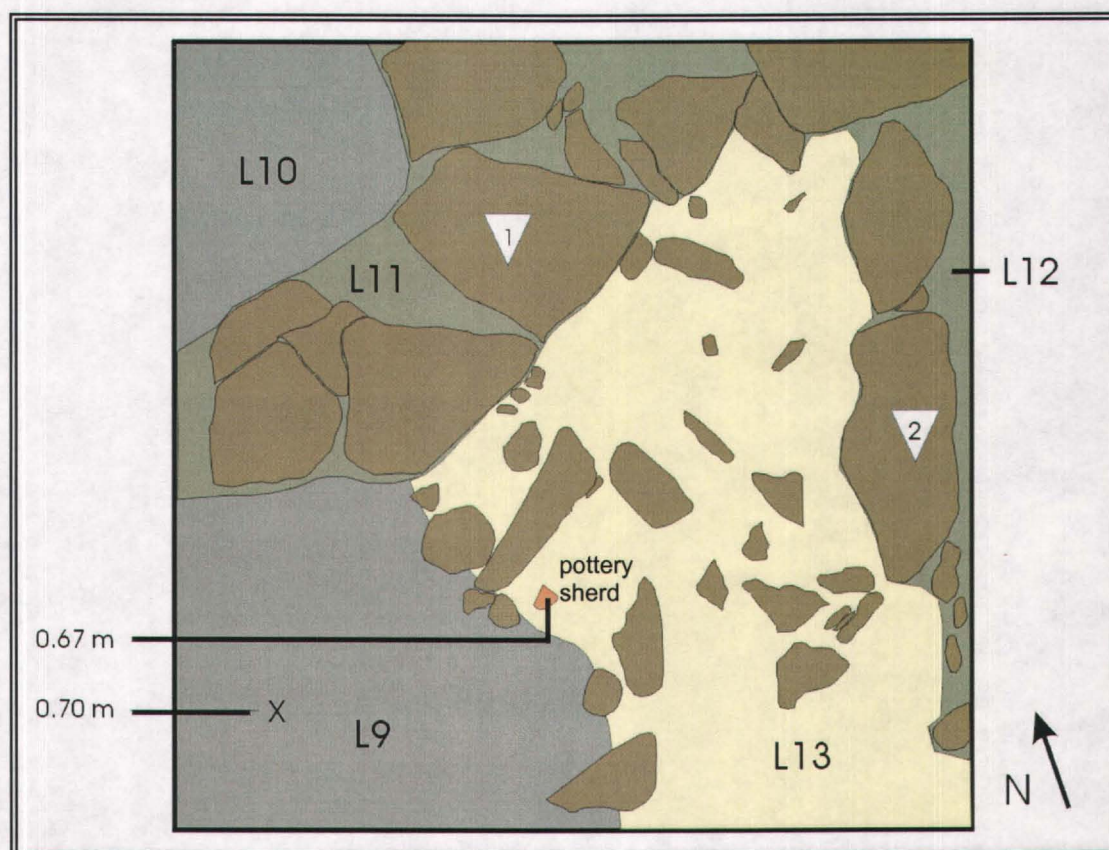


FIGURE 4.5. UM I - Unit 3: final top plan. Note the walls (1 and 2), occupation surface (L13), and pottery sherd on the surface.

The stratigraphy in Unit 3 is complex and difficult to understand due to the limited size of the exposure. The sediment, in general, was moderately loose and had a high ash content. The upper loci (loci 1, 2, 3, and 5) consist of water-lain deposits and are not differentiated in the section (Figure 4.6). Loci 3, 4, and 6 are clear ash lenses. Just above and below locus 3 are several carbonate deposits. Loci 7 and 8 consist of light reddish brown, moderately loose deposit with few inclusions. This deposit lies in the northwest corner of the unit outside a cluster of medium-sized cobbles. Just below locus 8 is the puddled mud surface that seals against the walls. Two artifacts, a flake and a pottery sherd, were found *in situ* on the floor.

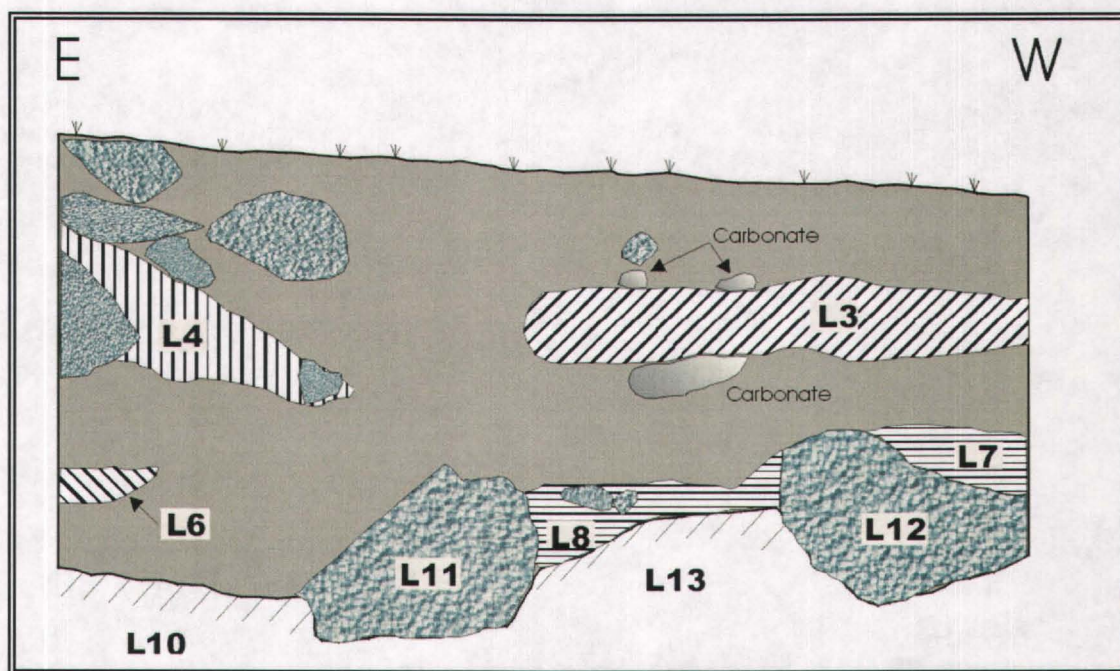


FIGURE 4.6. UM I - Unit 3: final section.

After the identification of Late Neolithic artifacts at UM I, the survey team identified what appeared to be two walls converging to make a corner. This feature is located just beyond the termination of the debris field. The survey team positioned Unit 4

on the inside and Unit 5, a half unit, on the eastern side of this corner to determine the possible presence of an occupational surface associated with the architecture (Figure 4.7). Excavation depth reached 0.46 meters in Unit 4 and 0.29 meters in Unit 5.

The excavation did not confirm an occupation surface associated with the architecture. The absence of a surface likely is due to erosion. In Unit 4, however, the excavation team noted the appearance of a concentration of cobbles that had the appearance of a surface. This possible surface covered the north-eastern portion of the unit. It was not determined if this was a natural or anthropogenic deposit. The excavation did produce a number of burned bones, lithics and pottery sherds in both units.

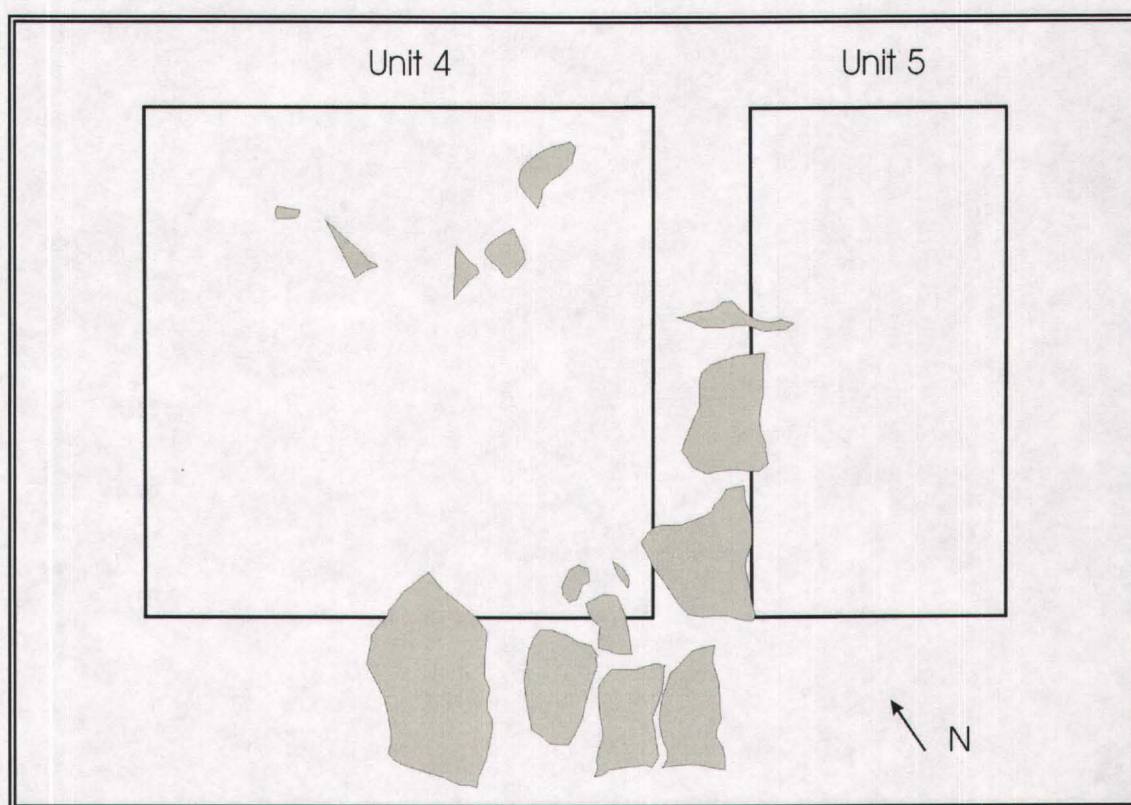


FIGURE 4.7. UM I - Units 4 and 5: final top plan

4.3.2 *Umm Mesbrat II*

The survey excavated two test probes at UM II (Figure 4.8). The purpose of the probes was to determine if the surface lithic scatter was related to the circular structures. The two test probes were placed inside and outside a circular structure. The units abutted the wall of the structure because preservation is likely to be better closer to the walls.

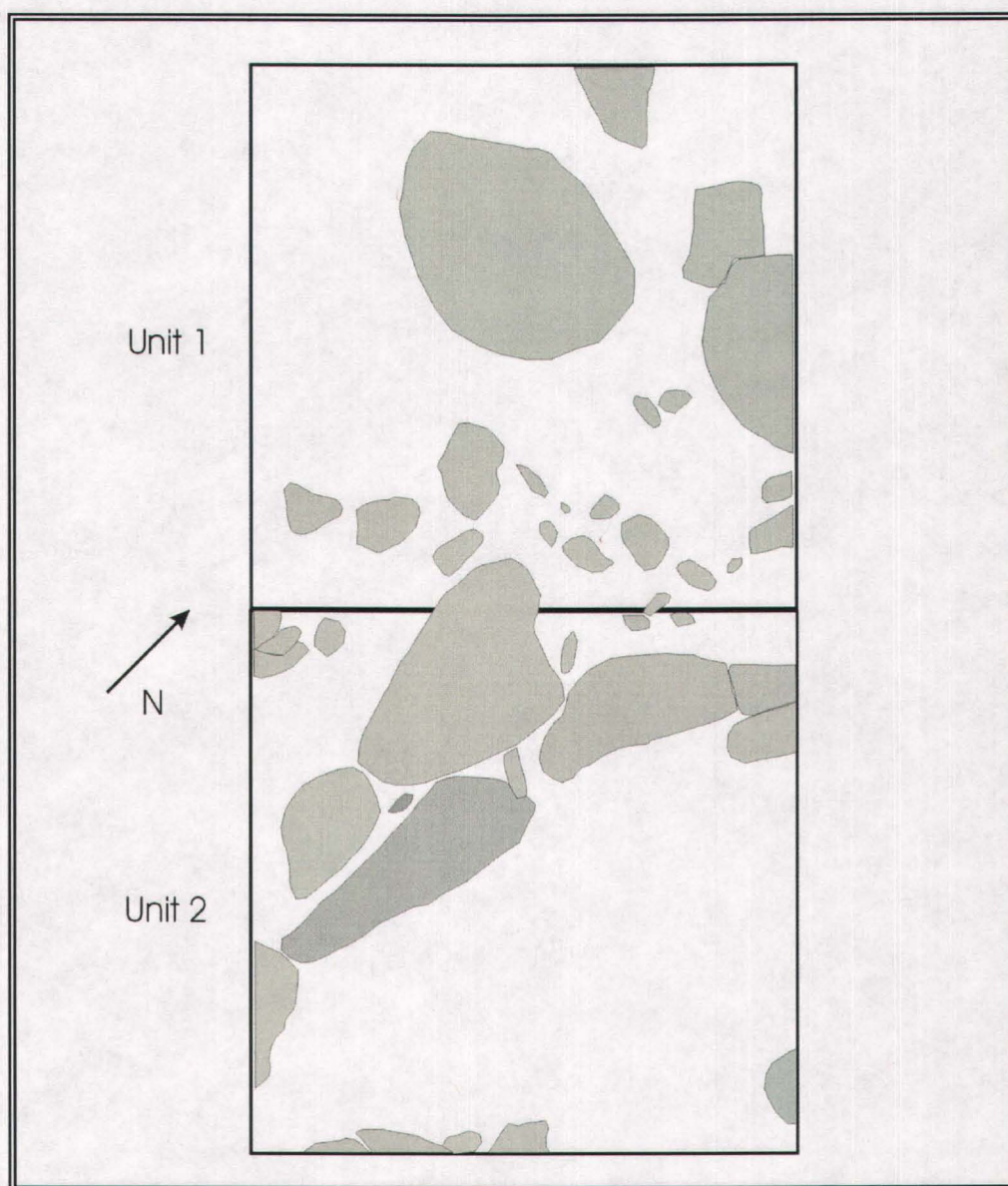


FIGURE 4.8. UM II – Units 1 and 2: final top plans.

The survey team excavated Units 1 and 2 to depths of 0.52 meters and 0.50 meters, respectively. Although the excavation did not produce an *in situ* occupational deposit, artifacts were abundant. Numerous lithic artifacts were collected including a bifacial tile knife. Pottery, burned bone and fire-cracked rock were also recovered during excavation of the units. The pottery collected from the units stands out because prior to excavation the site was assumed to be Pre-Pottery Neolithic.

CHAPTER 5: THE MATERIAL CULTURE

5.1 INTRODUCTION

In the 2001 season, the Wadi ath-Thamad survey recovered approximately 5700 chipped stone artifacts and 47 pottery sherds from UM I and II. The following chapter examines these collections including discussions of both the debitage and formed tool classes of the lithics and the ware and decoration types of the pottery. Also included in this chapter is how the collections relate to one another at the site level and between UM I and II. The collections are also compared with LN assemblages from other sites such as 'Ain Ghazal, Wadi Shu'eib, Dhuweila, and Sha'ar Hagolan to determine if any similarities or differences are apparent. This may be useful to help determine both the type of site and the LN tradition at UM I and II.

5.2 CHIPPED STONE COLLECTIONS

The chipped stone collections from UM I and II were classified according to the scheme used by McCartney and Betts (1998: 59-119) at the LN site Dhuweila. This classification scheme was adopted for this thesis for several reasons. Primarily, it was important to use a typology that is defined clearly as is McCartney and Betts' (1998) chipped stone typology. The second key factor for choosing a typology is that it would be comparable with schemes used at other sites of similar periods. McCartney and Betts'

typology has been used for a range of sites including campsites, such as Dhuweila, stations, such as al-Ghirqa, and a number of burin sites (McCartney and Betts 1998, Betts 2003.). While it would have been ideal to adopt the 'Ain Ghazal classification scheme, which also was used at Wadi Shu'eib, the typology was not specifically defined (Rollefson 1988, 1995; Rollefson, Forestadt and Beck 1994; Rollefson and Simmons 1986; Simmons et al. 2001). McCartney and Betts' classification scheme does not differ significantly from that used at 'Ain Ghazal and Wadi Shu'eib. Because the lithic types were not described in sufficient detail in the reports of the latter sites, significant discrepancies may occur when comparisons of the data from 'Ain Ghazal and Wadi Shu'eib are made with the data from UM. Only broad comparisons can be made between these data sets.

During the 2001 field season, just fewer than 5800 lithics were recovered through surface collection and excavation of seven test probes. As discussed in Chapter 4, Units 1 and 2 from UM I are excluded from this research, decreasing the total number of chipped stone artifacts examined to 3053. As demonstrated by Tables 5.1 and 5.2 the material from both the surface and excavated units at UM I and II is well represented in the lithic collection. The high proportion of surface artifacts from UM II demonstrates the density of the lithic scatter at this site. The time spent surface collecting at UM II is approximately one quarter that spent at UM I, yet the number of lithics collected from UM II is more than doubled that collected from UM I (Table 5.1). The density of lithic scatter at UM II is apparent. The number of chipped stone artifacts collected from the excavated units at UM II is slightly higher than at UM I. This fact also is indicative of the higher concentration of lithics at UM II because less sediment was excavated at UM II than at UM I. The distribution of the lithic artifacts varies within the excavated units at UM I and II (Table

5.3). Unit 1 at UM II, which you will recall from Chapter 4 (Section 4.3.2) is the exterior unit, has a higher proportion of lithics than Unit 2. Although the excavation at UM II is limited, it suggests that the distribution of lithics in excavated units parallels the distribution of surface lithics where it was observed that the density of surface lithic increased up to the circular structures, but sharply decreased inside the features.

	UM I - Surface	UM I - Units	UM I - TOTAL	UM II - Surface	UM II - Units	UM II - TOTAL
	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>
Primary Blades	1	0	1	3	0	3
Secondary Blades	0	0	0	3	1	4
Non-cortical Blades	9	2	11	4	1	5
Primary Bladelets	1	0	1	2	0	2
Secondary Bladelets	1	1	2	2	0	2
Non-cortical Bladelets	25	9	34	9	8	17
Primary Flakes	4	25	29	10	10	20
Secondary Flakes	5	51	56	8	17	25
Non-cortical Flakes	49	104	153	46	61	107
Spalls	4	5	9	41	11	52
Debris	12	54	66	48	58	106
Crested Pieces	6	6	12	2	12	14
Platform Rejuvenations	0	1	1	1	2	3
Hinged	8	0	8	0	8	8
Overshots	2	2	4	6	1	7
Opposed Platform	2	1	3	13	3	16
Single Platform	2	4	6	11	0	11
Crossed Platform	0	3	3	2	0	2
Amorphous	0	1	1	0	0	0
Alternate Platform	0	0	0	0	1	1
On-Flake	1	1	2	1	0	1
Indeterminate	3	3	6	7	2	9
Subtotal	135	273	408	219	196	415
Tools	533	184	717	1209	304	1513
Total	668	457	1125	1428	500	1928

TABLE 5.1. Absolute frequency of debitage classes.

	UM I - Surface	UM I - Units	UM I - TOTAL	UM II - Surface	UM II - Units	UM II - TOTAL
	%	%	%	%	%	%
Primary Blades	0.15	0.00	0.09	0.21	0.00	0.16
Secondary Blades	0.00	0.00	0.00	0.21	0.20	0.21
Non-cortical Blades	1.35	0.44	0.98	0.28	0.20	0.26
Primary Bladelets	0.15	0.00	0.09	0.14	0.00	0.10
Secondary Bladelets	0.15	0.22	0.18	0.14	0.00	0.10
Non-cortical Bladelets	3.74	1.97	3.02	0.63	1.60	0.88
Primary Flakes	0.60	5.47	2.58	0.70	2.00	1.04
Secondary Flakes	0.75	11.16	4.98	0.56	3.40	1.30
Non-cortical Flakes	7.34	22.76	13.60	3.22	12.20	5.55
Spalls	0.60	1.09	0.80	2.87	2.20	2.70
Debris	1.80	11.82	5.87	3.36	11.60	5.50
Crested Pieces	0.90	1.31	1.07	0.14	2.40	0.73
Platform Rejuvenations	0.00	0.22	0.09	0.07	0.40	0.16
Hinged Pieces	1.20	0.00	0.71	0.00	1.60	0.41
Overshots	0.30	0.44	0.36	0.42	0.20	0.36
Opposed Platform	0.30	0.22	0.27	0.91	0.60	0.83
Single Platform	0.30	0.88	0.53	0.77	0.00	0.57
Crossed Platform	0.00	0.66	0.27	0.14	0.00	0.10
Amorphous	0.00	0.22	0.09	0.00	0.00	0.00
Alternate Platform	0.00	0.00	0.00	0.00	0.20	0.05
On-Flake	0.15	0.22	0.18	0.07	0.00	0.05
Indeterminate	0.45	0.66	0.53	0.49	0.40	0.47
Subtotal	20.21	59.74	36.27	15.34	39.20	21.52
Tools	79.79	40.26	63.73	84.66	60.80	78.48
Total	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 5.2. Relative frequency of debitage classes

Total Chipped Stone Artifacts		
	n	%
UM I - Unit 3	119	27.87
UM I - Unit 4	225	52.69
UM I - Unit 5	83	19.44
UM I - TOTAL UNITS	427	100.00
UM II - Unit 1	285	57.00
UM II - Unit 2	215	43.00
UM II - TOTAL UNITS	500	100.00

TABLE 5.3. Proportion of lithics from excavated units.

5.2.1 *Umm Mesbrat Debitage*

Debitage counts and frequencies are presented in Tables 5.1 and 5.2. A total of 823 chipped stone artifacts are classified asdebitage and account for 27 % of the total collections from UM I and II. In all collections, non-cortical blanks outnumber primary and secondary blanks, suggesting that non-cortical blanks were more desirable. All collections have low proportions of core trimming elements (CTE), with crested pieces being the most common type at both sites. Cores are also found in low proportion. Although in low numbers CTEs, primary and secondary blanks, and cores are recorded at UM I and II, and their presence indicates that primary reduction occurred on site. Spalls are found relatively infrequently except for the surface collection at UM II where 41 were recovered. The proportions of debris, which are lithics that do not contain standardized features, are lower in the surface material compared with the excavated material at both UM I and II. This is likely the result of the judgemental collection methodology employed during surface collection at these sites and only further excavation at these sites will determine this issue.

Table 5.4 summarizes the proportions of flakes, blades, and bladelets in the UMdebitage class. Primary (> 50% dorsal cortex), secondary (< 50 % dorsal cortex) and non-cortical flakes, blades, and bladelets are combined to produce the total number of these blanks. In all collections flakes are dominant over blades with up to a maximum of 93.8 % observed in the UM I units collection. Blades constitute only a minimal percentage of the blanks, as low as 1 % in UM I excavated units. This domination of flakes is seen at numerous LN sites including ‘Ain Ghazal, Wadi Shu’eib (Simmons et al. 2001: 10) and Dhuweila (McCartney and Betts 1998: 63), although the flake to blade ratio at these sites was not as extreme as that found in the excavated collections at UM I and II. Both surface

collections, however, have lower frequencies of flakes as compared with the excavated units. In the case of the UM I surface collection there is clear mixing of the LN material with both Epipaleolithic and Upper Paleolithic materials (see 'Geometrics, Microliths and Paleolithic Tools' below). The surface collection from UM I has higher proportions of bladelets than the UM I excavated material and both UM II collections. This likely is due to the highly mixed nature of the UM I surface collection.

	UM I - Surface % (n = 95)	UM I - Units % (n = 192)	UM I - TOTAL % (n = 287)	UM II - Surface % (n = 87)	UM II - Units % (n = 98)	UM II - TOTAL % (n = 187)
Blades	10.53	1.04	4.18	11.49	2.04	6.49
Bladelets	28.42	5.21	12.89	14.94	8.16	11.35
Flakes	61.05	93.75	82.93	73.56	89.80	82.16

TABLE 5.4. Relative frequency of flakes, blades and bladelets.

Cores make up a small portion of the total lithics in each collection. As noted by McCartney and Betts (1998: 60), cores are a part of the reduction strategy, and thus are considered among the debitage classes. Table 5.5 shows the absolute and relative proportions of cores collected from UM I and II. The sample is made up of sixty-one cores with 21 from UM I and 40 from UM II. Cores were classified according to the typology defined by McCartney and Betts (1998: 69-83). Core fragments were included in this class and classified along with complete cores. Six core types are represented in the UM collections, including opposed platform, single platform, crossed platform, amorphous, alternate platform, and on-flake. A seventh class, indeterminate, was included for unidentifiable core fragments. Among the six true core types, single platform cores are most common at UM I with 28.6 %. Opposed platform types were most common at UM II with 40% of the total cores. No naviform cores were present in the UM collections.

Naviform cores are commonly found in PPN assemblages and are associated with standardized blade production.

		UM I Surface	UM I Unit 3	UM I Unit 4	UM I Unit 5	UM I TOTAL	UM II Surface	UM II Unit 1	UM II Unit 2	UM II TOTAL
Opposed Platform	<i>n</i>	2	0	1	0	3	13	1	2	16
	%	25.00	0.00	14.29	0.00	14.29	38.24	50.00	50.00	40.00
Single Platform	<i>n</i>	2	2	1	1	6	11	0	0	11
	%	25.00	50.00	14.29	50.00	28.57	32.35	0.00	0.00	27.50
Crossed Platform	<i>n</i>	0	0	3	0	3	2	0	0	2
	%	0.00	0.00	42.86	0.00	14.29	5.88	0.00	0.00	5.00
Amorphous	<i>n</i>	0	1	0	0	1	0	0	0	0
	%	0.00	25.00	0.00	0.00	4.76	0.00	0.00	0.00	0.00
Alternate Platform	<i>n</i>	0	0	0	0	0	0	0	1	1
	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.00	2.50
On-Flake	<i>n</i>	1	0	0	1	2	1	0	0	1
	%	12.50	0.00	0.00	50.00	9.52	2.94	0.00	0.00	2.50
Indeterminate	<i>n</i>	3	1	2	0	6	7	1	1	9
	%	37.50	25.00	28.57	0.00	28.57	20.59	50.00	25.00	22.50
Total	<i>n</i>	8	4	7	2	21	34	2	4	40

TABLE 5.5. Relative and Absolute core subtype frequencies.

5.2.2 Chipped Stone Tools

During the 2001 excavation and surface collection at UM I and II, 2722 chipped stone tools were recovered (Tables 5.6 and 5.7). Formed tools dominate each collection and consist of up to 84.7 % of the total chipped stone artifacts, as seen in the UM II surface collection. The high proportion of tools in both surface collections may reflect the sampling technique employed. Formed tools also make up a significant proportion of the total lithics collected from excavation units at UM I and II, with 40.2 % and 60.8 % respectively. The high proportion of formed tools in the excavated collections suggests that the high number of formed tools in the surface collections may not be a result of sampling techniques. These frequencies are much higher than at 'Ain Ghazal (Rollefson and Kafafi 1997a: 43; Rollefson and Kafafi 1997b: 23), Wadi Shu'eib (Simmons et al. 2001: 10), and

TOTAL TOOLS	UM I Surface <i>n</i>	UM I Unit 3 <i>n</i>	UM I Unit 4 <i>n</i>	UM I Unit 5 <i>N</i>	UM I TOTAL <i>n</i>	UM II Surface <i>n</i>	UM II Unit 1 <i>n</i>	UM II Unit 2 <i>n</i>	UM II TOTAL <i>n</i>
Arrows	2	1	0	0	3	2	0	0	2
Awls	23	2	16	8	49	112	12	14	138
Burins	24	0	6	2	32	226	19	7	252
Denticulates	34	0	2	4	40	96	8	2	106
Drill	9	5	14	0	28	60	8	6	74
Multiple Tool	5	0	0	1	6	28	1	2	31
Notches	17	2	7	0	26	65	7	7	79
Scrapers	29	2	0	0	31	34	1	5	40
Sickle	1	0	0	0	1	0	0	0	0
Tile Knives	1	1	0	0	2	0	0	1	1
Truncations	9	1	2	0	12	50	4	3	57
Paleolithic	26	0	0	0	26	0	0	0	0
Microliths	12	0	0	0	12	0	0	0	0
Geometrics	10	0	0	0	10	1	0	0	1
Utilized	148	19	24	12	203	148	38	33	219
Retouched	178	12	22	18	230	386	80	46	512
Other	5	1	0	0	6	1	0	0	1
Total	533	46	93	45	717	1209	178	126	1513

TABLE 5.6. Absolute frequencies of formed tools.

TOTAL TOOLS	UM I Surface %	UM I Unit 3 %	UM I Unit 4 %	UM I Unit 5 %	UM I TOTAL %	UM II Surface %	UM II Unit 1 %	UM II Unit 2 %	UM II TOTAL %
Arrows	0.38	2.17	0.00	0.00	0.42	0.17	0.00	0.00	0.13
Awls	4.32	4.35	17.20	17.78	6.83	9.26	6.74	11.11	9.12
Burins	4.50	0.00	6.45	4.44	4.46	18.69	10.67	5.56	16.66
Denticulates	6.38	0.00	2.15	8.89	5.58	7.94	4.49	1.59	7.01
Drill	1.69	10.87	15.05	0.00	3.91	4.96	4.49	4.76	4.89
Multiple Tool	0.94	0.00	0.00	2.22	0.84	2.32	0.56	1.59	2.05
Notches	3.19	4.35	7.53	0.00	3.63	5.38	3.93	5.56	5.22
Scrapers	5.44	4.35	0.00	0.00	4.32	2.81	0.56	3.97	2.64
Sickle	0.19	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00
Tile Knives	0.19	2.17	0.00	0.00	0.28	0.00	0.00	0.79	0.07
Truncations	1.69	2.17	2.15	0.00	1.67	4.14	2.25	2.38	3.77
Paleolithic	4.88	0.00	0.00	0.00	3.63	0.00	0.00	0.00	0.00
Microliths	2.25	0.00	0.00	0.00	1.67	0.00	0.00	0.00	0.00
Geometrics	1.88	0.00	0.00	0.00	1.39	0.08	0.00	0.00	0.07
Utilized	27.77	41.30	25.81	26.67	28.31	12.24	21.35	26.19	14.47
Retouched	33.40	26.09	23.66	40.00	32.08	31.93	44.94	36.51	33.84
Other	0.94	2.17	0.00	0.00	0.84	0.08	0.00	0.00	0.07
Total	74.34	6.42	12.97	6.28	100.00	79.91	11.76	8.33	100.00

TABLE 5.7. Relative frequencies of formed tools.

Dhuweila (McCartney and Betts 1998: 63) where formed tools account for less than 15 % of the total assemblage. The exception to this trend is seen in the Yarmoukian assemblage recovered from the 1996 season at the main site at 'Ain Ghazal where formed tools account for 23% of the lithic assemblage (Rollefson and Kafafi 1997a: 43). This high proportion of tools at UM I and II is likely due to the fact that only a very small portion of each site was excavated and all units were placed near architectural elements or, as in the case of Unit 3 at UM I, where excavation revealed an occupational surface. It is clear that human activity occurred in these particular locations. This fact might have affected the likelihood of recovering high proportions of formed tools.

Retouched pieces are the most frequent formed tool type in all UM collections. At UM I retouched pieces are followed closely by utilized pieces at 32.1 % and 28.3 % respectively. The proportions at UM II are quite different, with burins being the second most common formed tool, followed by utilized pieces. All other formed tools from UM I and II occur in relatively low proportions. Tables 5.6 and 5.7 indicate that some tool types, however, are quite concentrated within particular units. These concentrations of particular formed tool types may represent specific activity areas. This data is from preliminary test probes and only further excavations can determine if this speculation is accurate.

5.2.2.1 Arrows

Arrows are one of the few formed tool classes where there is a consensus among researchers regarding their typology. Seriation analyses have demonstrated that arrow types are a useful chronological marker. Gopher (1994) established that three projectile point types, ha-Parsa, Nizzanim, and Herzliya, do not appear earlier than the LN, while PPN types including Jericho and Byblos points continue to appear throughout the LN in

decreasing proportions. In the UM collections five arrows were recovered constituting less than 1 % of the formed tools (Figure B-1). Although no complete point was recovered in the 2001 season, the points that were collected retain enough diagnostic characteristics to determine type. Three points were recovered from UM I including a ha-Parsa point, a Jericho point, and an El-Wad point. The Jericho and El-Wad points were found during the surface survey. The El-Wad point is typical of Late Natufian assemblages (Bar-Yosef 1970). Jericho points are found in PPN and LN assemblages (Gopher 1994). The presence of both Natufian and PPN/LN points in the UM I surface collection further demonstrates the mixed nature of the collection. The base of a ha-Parsa point was excavated from Locus 5 (0.31-.045 m DBD) of Unit 3. The presence of this point type at UM I indicates that the cultural deposit at least dates to the LN period. Two points, a ha-Parsa and a Jericho, were recovered from the surface collection at UM II. As at UM I, the presence of the ha-Parsa point suggests a LN occupation. The points collected from UM II, however, were surface finds and because of the lack of context, they cannot be used conclusively to identify a relative date.

Arrows generally constitute a small portion of the formed tools in LN assemblages reflecting a decreased reliance on hunting and an increase in pastoralism. The proportion of arrows at UM is particularly low. Jebel Naja, a LN burin site, also has low frequencies of arrows with less than 1 % (n=4) in the total of formed tools. Wadi Shu'eib, Burqu' Site 3000, and 'Ain Ghazal show similar frequencies, although slightly higher, with 6.2 % (n=28), 4.7 % (n=32) and 2 % (n=15) (Simmons et al. 2001: 11; Betts 2003; Rollefson and Simmons 1988:406). Conversely, arrows constitute 21 % of the total formed tools at Dhuweila (McCartney and Betts 1998: 94).

5.2.2.2 Awls

Awls make up 6.8 % and 9.1 % of the formed tools from UM I and II, respectively (Figure B-2). The class, defined by McCartney and Betts (1998: 108), is relatively broad and lacks subdivisions, unlike the borer typology defined by Beck (in Rollefson et al. 1994). McCartney and Betts (1998: 108-113) does not specifically define awls. Therefore, Rosen's (1997: 68) definition is used, whereby "awls are manufactured by single-notching a flake against a corner or double-notching a flake to produce shoulders and a point between the two notches." It should be noted that awls have been separated from drills (see 'drills' below). At UM I awls are the third most common type of formed tool after retouched and utilized pieces. The frequency of awls is particularly high in Units 4 and 5 at UM I where they make up approximately 17 % of the formed tools. Awls are one of the predominant tool classes at UM II as well, fourth to retouched pieces, burins, and utilized pieces.

In the 'Ain Ghazal and Wadi Shu'eib publications awls, borers, and drills are combined making it difficult to evaluate how the data from these sites compares with UM (Rollefson and Kafafi 1997a; Simmons et al. 2001). Stekelis (1972) uses another typology that appears to combine both awls and drills, as defined in this thesis, into a single category, awls. Thus meaningful comparisons of awls can only be made with Dhuweila where 48 awls make up 2.4 % of the total formed tools from the LN assemblage. UM I has a moderately higher proportion of awls than recorded at Dhuweila.

5.2.2.3 Burins

Burins constitute a large portion of the formed tools from UM II (Figure B-3). Therefore, it was necessary to adopt a typology with an adequate treatment of the various types of burins. While burin typology is well established, the level of classification can vary.

Unlike the burin typology used by Stekelis (1972), which contains few types, the classification of burins used at 'Ain Ghazal and Wadi Shu'eib (Rollefson 1988, 1995) is very specific and contains all types observed in the collections from UM. While Rollefson's (1995) classification of burins is more detailed than Bett's (1998: 101) classification, the two schemes are very similar. The high degree of congruence between burin typologies makes it possible to make meaningful comparisons among a number of sites. Two burin types, simple blow burin (no platform preparation) and burin on straight truncation, are represented in the UM collections but are not included in McCartney and Betts' (1998: 101) typology. These types are included in Rollefson's (1988, 1995) burin typology. Transverse truncation and offset dihedral burin types used by McCartney and Betts (1998: 101) are not found in the UM collections.

Of the 284 burins recorded at UM I and II, 252 were from UM II (Table 5.8). Very few burins were found in the units at UM I. Most of the burins at UM II were from the surface. Tables 5.8 and 5.9 demonstrate the absolute and relative frequencies of each burin subtype in the collection. At both UM I and II concave truncation burins are most

	UM I Surface N	UM I Unit 3 n	UM I Unit 4 n	UM I Unit 5 n	UM I TOTAL n	UM II Surface n	UM II Unit 1 n	UM II Unit 2 n	UM II TOTAL n
Concave truncation	9	0	4	0	13	84	6	3	93
Oblique truncation	3	0	1	1	5	53	3	1	57
Straight truncation	1	0	0	0	1	17	1	0	18
Dihedral	0	0	0	0	0	3	1	0	4
Multiple mixed	6	0	0	0	6	28	0	0	28
On break	2	0	0	1	3	6	0	0	6
Simple blow burin	3	0	1	0	4	24	5	1	30
Transverse	0	0	0	0	0	3	2	0	5
Nucleiform	0	0	0	0	0	1	0	1	2
Broken	0	0	0	0	0	7	1	1	9
Total	24	0	6	2	32	226	19	7	252

TABLE 5.8. Absolute frequency of burin types.

common. Truncation burins are the most common burin type at LN sites (McCartney and Betts 1998: 101). The majority of the burins from UM I and II have multiple removals, which supports the theory that these burins were not tools, but served as cores for the production of burin spalls. Burins with multiple removals are typical in LN assemblages. In addition, very few of the burins showed obvious signs of use or retouch.

	UM I Surface %	UM I Unit 3 %	UM I Unit 4 %	UM I Unit 5 %	UM I TOTAL %	UM II Surface %	UM II Unit 1 %	UM II Unit 2 %	UM II TOTAL %
Concave truncation	37.50	0.00	66.67	0.00	40.63	37.17	31.58	42.86	36.90
Oblique truncation	12.50	0.00	16.67	50.00	15.63	23.45	15.79	14.29	22.62
Straight truncation	4.17	0.00	0.00	0.00	3.13	7.52	5.26	0.00	7.14
Dihedral	0.00	0.00	0.00	0.00	0.00	1.33	5.26	0.00	1.59
Multiple mixed	25.00	0.00	0.00	0.00	18.75	12.39	0.00	0.00	11.11
On break	8.33	0.00	0.00	50.00	9.38	2.65	0.00	0.00	2.38
Simple blow burin	12.50	0.00	16.67	0.00	12.50	10.62	26.32	14.29	11.90
Transverse	0.00	0.00	0.00	0.00	0.00	1.33	10.53	0.00	1.98
Nucleiform	0.00	0.00	0.00	0.00	0.00	0.44	0.00	14.29	0.79
Broken	0.00	0.00	0.00	0.00	0.00	3.10	5.26	14.29	3.57
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 5.9. Relative frequency of burin types.

Burins are found at many LN site in varying proportions. Their presence is attested at numerous sites that span wide geographical distances, as well as at sites in close geographical proximity, such as UM I and II. As indicated by Table 5.10, the frequency of burins at UM I is most similar to the Yarmoukian assemblage at Sha'ar Hagolan. UM II, however, has comparable burin proportions to 'Ain Ghazal, Wadi Shu'eib, and Dhuweila.

Site	Frequency		Source
Sha'ar Hagolan	2.3 %	53	Stekelis 1972: 12
'Ain Ghazal*	17.8 %	135	Rollefson and Simmons 1988: 406
Wadi Shu'eib	13 %	63	Simmons et al. 2001: 11
Dhuweila	15.8 %	318	McCartney and Betts 1998: 94
Burqu' Site 3000	44.7 %	303	Betts 2003
Jebel Naja	80 %	1026	Betts 2003
UM I	4.5 %	32	
UM II	16.7 %	252	

* 1983-1985 seasons

TABLE 5.10. Absolute and Relative frequencies of burins at selected LN sites.

5.2.2.4 Denticulates

Denticulates are defined as having more than two notches. This class is amorphous because notches are produced on a number of blanks including flakes, blades, bladelets, and other blanks including CTEs. A fifth category, Yarmoukian, is included in this class to describe coarsely denticulated blades that are abundant at such Yarmoukian sites as Sha'ar Hagolan (Stekelis 1972). Tables 5.11 and 5.12 summarize the relative and absolute frequencies of denticulate subtypes. The inclusion of the Yarmoukian category in the denticulates class differs significantly from the typology used at 'Ain Ghazal, Wadi Shu'eib, and Sha'ar Hagolan where denticulated blades would have either been classified as sickles or denticulated blades (Simmons et al. 2001; Stekelis 1972). This typological problem is related to the classification of sickle elements (see 'Sickle Elements' below). Blades with denticulation that do not exhibit sickle shine are, for the purpose of this thesis, classified as denticulates. This typological divergence creates a problem for comparison of the denticulates class, as well as the sickle blade class.

	UM I Surface n	UM I Unit 3 n	UM I Unit 4 n	UM I Unit 5 n	UM I TOTAL n	UM II Surface n	UM II Unit 1 n	UM II Unit 2 n	UM II TOTAL n
Flake	11	0	1	2	14	35	2	0	37
Blade*	18	0	0	2	20	45	2	1	48
Bladelet*	1	0	0	0	1	6	2	0	8
Yarmoukian **	3	0	1	0	4	8	1	1	10
Other	1	0	0	0	1	2	1	0	3
Total	34	0	2	4	40	96	8	2	106

* fine and moderate denticulation

** coarse denticulation

TABLE 5.11. Absolute frequency of denticulates.

	UM I Surface %	UM I Unit 3 %	UM I Unit 4 %	UM I Unit 5 %	UM I TOTAL %	UM II Surface %	UM II Unit 1 %	UM II Unit 2 %	UM II TOTAL %
Flake	32.35	0.00	50.00	50.00	35.00	36.46	25.00	0.00	34.91
Blade*	52.94	0.00	0.00	50.00	50.00	46.88	25.00	50.00	45.28
Bladelet*	2.94	0.00	0.00	0.00	2.50	6.25	25.00	0.00	7.55
Yarmoukian**	8.82	0.00	50.00	0.00	10.00	8.33	12.50	50.00	9.43
Other	2.94	0.00	0.00	0.00	2.50	2.08	12.50	0.00	2.83
Total	100.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

* fine and moderate denticulation

** coarse denticulation

TABLE 5.12. Relative frequency of denticulates.

Moderate numbers of denticulates are identified among the UM collections (Figure B-4). At UM I and II, denticulates constitute 5.6 % and 7 % respectively of the total formed tools. Most of the denticulates are in the surface collections of both UM I and II, while the units have few or none. UM II has nearly triple the amount of denticulates than at UM I. Denticulated blades are most common followed by flakes in all UM collections (Tables 5.11 and 5.12). A number of Yarmoukian denticulates is found noted at both sites, although they are in low proportion compared with the fine and moderately denticulated blades. Denticulates are infrequent in the LN assemblage at Dhuweila where 45 make up 2.2 % of the formed tools (McCartney and Betts 1998: 94). Most of the denticulates at

Dhuweila were made on flakes and only one Yarmoukian denticulate was recorded in the late PPNB assemblage (McCartney and Betts 1998: 116). Jebel Naja yielded no denticulates and a total of five (0.7 %) were recorded at 'Burqu Site 3000 (Betts 2003).

5.2.2.5 Drills

Drills, unlike awls, have elongated bits that generally are “worked by use and/or retouch around the tip and for roughly a centimeter below the tip (McCartney and Betts 1998: 113).” McCartney and Betts’ (1998: 113) drill typology does not subdivide this class. The total formed tool class from UM I is composed of 3.8 % drills (Figure B-5). While the frequency of drills is rather low when looking at total collection from the site, Units 3 and 4 have relatively high proportions with 10.9 % and 15 % respectively. At UM II, drills make up 4.9 % of the total formed tool class. Nearly equal proportions are found in the surface collection, Unit 1 and Unit 2.

Comparison of the drill class in the UM collections with other sites is difficult because the same problems discussed with awls apply to drills. This typological divergence leaves few sites to be compared with UM. Drills are found very infrequent at Dhuweila (McCartney and Betts 1998: 113). Seven drills in the LN assemblage constitute less than one percent of the total LN formed tool assemblage. Drills are much more common at Jebel Naja and Burqu’ Site 3000 with 4 % ($n = 52$) and 8 % ($n = 52$) of the formed tool assemblage respectively (Betts 2003). While it appears that the proportion of drills at UM is most similar to two burin sites, Jebel Naja and Burqu’ Site 3000), the ‘awl’ illustrations in the Sha‘ar Hagolan site report demonstrates a high proportion of drills in that assemblage (Plates 25-30 in Stekelis 1972).

5.2.2.6 Multiple Tools

In many cases formed tools such as burins also exhibit retouching. Instead of classifying these tools as multiple tools, they are categorized by their dominant type. Some formed tools, however, have strong characteristics of two or more formed tools. These tools are typed as multiple tools. Thirty-six multiple tools are present in the UM collections, making up 0.8 % and 2.1 % of the total formed tools at UM I and II (Figure B-6). The multiple tools class was further divided into eight subclasses (Table 5.13). Within these classes the multiple tool ‘awl and burin’ is dominant.

Multiple Tools	UM I Surface n	UM I Unit 3 n	UM I Unit 4 n	UM I Unit 5 n	UM I TOTAL n	UM II Surface n	UM II Unit 1 n	UM II Unit 2 n	UM II TOTAL n
Awl + Burin	1	0	0	0	1	11	0	1	12
Awl + Notch	1	0	0	0	1	5	0	0	5
Awl + Scraper	1	0	0	0	1	2	0	0	2
Burin + Scraper	2	0	0	1	3	0	0	0	0
Burin + Notch	0	0	0	0	0	4	1	0	5
Notch + Truncation	0	0	0	0	0	3	0	1	4
Notch + Scraper	0	0	0	0	0	2	0	0	2
Scraper + Drill	0	0	0	0	0	1	0	0	1
Total	5	0	0	1	6	28	1	2	31

TABLE 5.13. Absolute frequencies of the subdivisions of the multiple tools class.

5.2.2.7 Notches

The notch formed tool class is relatively unstructured as they are made on just about any blank including debris. Notches are simply categorized as either single or double since any piece with more than two notches is classified as a denticulate. Notches account for 3.6 % and 5.2 % respectively of the total formed tools from UM I and II (Figure B-7). They are fairly evenly distributed between the surface collections and the excavated units with the exception of Unit 5 at UM I where no notches were identified. Table 5.14 demonstrates that single notches are more common in the collections from UM I and double notches are more frequent at UM II.

		UM I Surface	UM I Unit 3	UM I Unit 4	UM I Unit 5	UM I TOTAL	UM II Surface	UM II Unit 1	UM II Unit 2	UM II TOTAL
Single	n	12	2	4	0	18	29	3	7	39
	%	70.59	100.00	57.14	0.00	69.23	44.62	42.86	100.00	49.37
Double	n	5	0	3	0	8	36	4	0	40
	%	29.41	0.00	42.86	0.00	30.77	55.38	57.14	0.00	50.63
Total	n	17	2	7	0	26	65	7	7	79

TABLE 5.14. Absolute and relative frequencies of notches.

Because notch typology is quite straightforward, comparisons between assemblages are possible. As Table 5.15 demonstrates, the proportion of notches at UM I and II is quite similar to Sha'ar Hagolan, 'Ain Ghazal, and Wadi Shu'eib, while Dhuweila and Burqu' Site 3000 have lower frequencies. None of the publications from Sha'ar Hagolan, 'Ain Ghazal, or Wadi Shu'eib have data regarding the proportion of single or double notches in this formed tool class.

Site	Frequency		Source
Sha'ar Hagolan	3.7 %	84	Stekelis 1972: 12
'Ain Ghazal *	7.4 %	56	Rollefson and Simmons 1988: 406
Wadi Shu'eib	5.8 %	26	Simmons et al. 2001: 11
Dhuweila	0.6 %	11	McCartney and Betts 1998: 94
Burqu' Site 3000	1 %	7	Betts 2003
UM I	3.6 %	26	
UM II	5 %	72	

* 1983-1985 seasons

TABLE 5.15. Absolute and relative frequency of notches at selected LN sites.

5.2.2.8 Scrapers

Scrapers constitute a small fraction of the total formed tools from UM I (4.3 %) and II (2.6 %) (Figure B-8). Scrapers are most common in the surface collected material from both sites, while the excavated units at both UM I and II are noted for the rarity or lack of scrapers. As discussed previously, this may reflect the collection strategy; however only future excavations will determine this if the distribution of scrapers is related to collection

methods. Scrapers are broadly grouped according to McCartney and Betts' typology (1998: 105), rather than finely subdivided (Rollefson, Forestadt, and Beck 1994: 447). Five types of scrapers are represented in the collections from UM with end and side scrapers comprising the majority (Tables 5.16 and 5.17). Only one tabular scraper was identified in the UM collections, which differs dramatically from the LN assemblage at Dhuweila where tabular scrapers make up just under a third of the scraper class (McCartney and Betts 1998: 105). The different scraper typologies employed at UM, 'Ain Ghazal, and Wadi Shu'eib make comparison between the assemblages difficult. However, general comments can be made. In the LN assemblage at Wadi Shu'eib scrapers constitute 16 % of the total formed tools (Simmons et al. 2001: 11). This proportion is slightly lower for the 1996 LN assemblage at 'Ain Ghazal where scrapers make up 12 % of the total formed tools (Rollefson and Kafafi 1997a: 44). With respect to percentages of formed tools, UM is much more similar to Dhuweila, where 5.7 % of the formed tools are scrapers.

	UM I - Surface n	UM I - Unit 3 n	UM I - Unit 4 n	UM I - Unit 5 n	UM I - TOTAL n	UM II - Surface n	UM II - Unit 1 n	UM II - Unit 2 n	UM II - TOTAL n
Side	13	1	0	0	14	17	1	2	20
End	14	1	0	0	15	15	0	3	18
Round	0	0	0	0	0	1	0	0	1
Core	1	0	0	0	1	1	0	0	1
Tabular	1	0	0	0	1	0	0	0	0
Total	29	2	0	0	31	34	1	5	40

TABLE 5.16. Absolute frequency of scrapers.

	UM I - Surface %	UM I - Unit 3 %	UM I - Unit 4 %	UM I - Unit 5 %	UM I - TOTAL %	UM II - Surface %	UM II - Unit 1 %	UM II - Unit 2 %	UM II - TOTAL %
Side	44.83	50.00	0.00	0.00	46.67	50.00	100.00	40.00	50.00
End	48.28	50.00	0.00	0.00	50.00	44.12	0.00	60.00	45.00
Round	0.00	0.00	0.00	0.00	0.00	2.94	0.00	0.00	2.50
Core	3.45	0.00	0.00	0.00	3.33	2.94	0.00	0.00	2.50
Tabular	3.45	0.00	0.00	0.00	50.00	0.00	0.00	0.00	0.00
Total	100.00	100.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00

TABLE 5.17. Absolute frequency of scrapers.

5.2.2.9 Sickle Elements

The classification of sickle elements (also referred to as sickle blades, which are the individual lithics that are inset into the sickle composite tool) is problematic because there is not a consensus of what defines its function or morphology. There are three basic views on what defines a sickle element:

1. the presence of sickle shine (McCartney and Betts 1998: 113);
2. the presence of sickle shine in addition to morphology (Rosen 1997: 55; Levy and Rosen 1987: 288);
3. only morphology (Nishiaki 1997: 60; Quintero et al. 1997).

While Rollefson (in Simmons et al. 2001: 13-14) does not state explicitly his definition of sickles, he does cite Quintero et al. (1997) who recognize that the presence or absence of sickle gloss should not be a defining attribute of these formed tools. Experimental use-wear analysis showed that there are many factors that influence the development of sickle shine, including the type of material the sickle was fashioned from, whether or not the material was heat treated, the placement of the sickle element within the sickle, the reaping action, and the moisture of the material being cut (Quintero et al. 1997). A sickle fitted with unglossed blades found at Hacilar further demonstrates that sickle shine should not be the defining characteristic of sickle elements (Quintero et al. 1997: 265). In addition, microwear studies have suggested that many LN sickles blades were not used for harvesting cereal grains or grasses (Quintero et al. 1997: 265). Quintero et al. (1997: 281) suggest that sickle blades “can be recognized by the patterned attributes of preparation, hafting, and edge modification, by wear and use damage on their working edges, and, where it occurs, by the presence of gloss.” These attributes include intentional edge modification and

adjustment of blade lengths by percussion, pressure trimming, and snapping (Quintero et al. 1997: 281). Nevertheless, for the purpose of this thesis, sickle elements will be defined according to presence of sickle gloss in order to maintain consistency with McCartney and Betts' (1998) typology. Using this typology, only one sickle element was identified in the surface collection from UM I.

The low frequency of sickle blades at UM is largely due to the strict classification scheme. Low proportions of sickle blades are also noted at Dhuweila where four sickle blades were identified in the LN assemblage (McCartney and Betts 1998: 113) (Figure 5.18). In many LN sites, sickle blades constitute a much higher proportion of the assemblage. The large variation in frequency of sickle blades from UM and Dhuweila compared with Sha'ar Hagolan, 'Ain Ghazal, and Wadi Shu'eib may be due to different economies. This explanation is likely considering the fact that the archaeologists publishing the latter sites have a much more inclusive sickle blade typology.

Site	Frequency		Source
Sha'ar Hagolan*	14.7 %	337	Stekelis 1972: 18
'Ain Ghazal	11.9 %	59	Rollefson and Kafafi 1997: 44
Wadi Shu'eib	6.1 %	23	Simmons et al. 2001: 11
Dhuweila	0.2 %	4	McCartney and Betts 1998: 113
UM I	< 1%	1	

*denticulated sickle blades only

TABLE 5.18. Relative and absolute frequencies of sickles at selected LN sites.

5.2.2.10 Tile Knives

Three tile knives are recorded in the UM collections, making up less than one percent of the total formed tools from each site (Figure B-9). Tile knives first appear in the PPNB, but are most common in the LN period (McCartney and Betts 1998: 108). They are

produced exclusively on thin pieces of tabular flint. According to McCartney and Betts (1998: 108), most tile knives are unilateral with one broken or naturally backed lateral edge. A single example of this type of tile knife was recovered from Unit 3 at UM I. The remaining two tile knives, one from Unit 2 at UM II and one from the UM I surface collection, have bilateral bifacial retouch. Lithic 6900 from Unit 2 at UM II shows semi-abrupt retouch on the right edge possibly to facilitate hafting. The example from the surface collected material at UM I is much thicker than the other two tile knives and is much less finely worked.

Rollefson et al. (1994: 451) include tile knives (type k-2b) as a subgroup within the knife class. In the 'Ain Ghazal and Wadi Shu'eib publications, the knife class is not broken into subgroups, thereby making comparisons with these sites impossible. There is no mention of tile knives or artifacts fitting this typology in the lithic assemblage from Sha'ar Hagolan (Stekelis 1972). Fifty-three tile knives were recorded in the LN assemblage from Dhuweila (McCartney and Betts 1998: 108).

5.2.2.11 Truncations

Truncations appear on a wide variety of blanks including flakes, blades, bladelets, and CTEs. Most frequent in the UM collections are truncations on secondary blades. Truncations account for 1.7 % of the UM I formed tools and 3.8 % of the formed tools at UM II (Figure B-10). Truncations are most common in both UM surface collections; few or no truncations were recovered from the excavations. Unipolar truncations are dominant in all collections.

Because truncation typology is consistent, reasonable comparisons can be made with several LN sites. Truncations generally make up only a small portion of LN formed

tool assemblages. At Sha'ar Hagolan, Stekelis (1972) did not record a single truncation. It is possible, however, that truncations were categorized with another class, but this seems unlikely. Wadi Shu'eib and 'Ain Ghazal (1983-1985 seasons) reported low frequencies of truncations, 2.9 % (n=13) and 4.3 % (n=33) respectively (Simmons et al. 2001; Rollefson and Simmons 1988). Dhuweila's LN assemblage also had low proportions of truncations with only 0.8 % (n=16) (McCartney and Betts 1998: 94), as did Jebel Naja where truncations composed 3.1 % (n=21) of the total formed tools (Betts 2003). The frequency of truncations at UM is comparable to all of these sites with the exception of Sha'ar Hagolan. Only Dhuweila has a breakdown of truncation types and like UM, unipolar truncations are predominant (Table 5.19).

		UM I - Surface	UM I - Unit 3	UM I - Unit 4	UM I - Unit 5	UM I - TOTAL	UM II - Surface	UM II - Unit 1	UM II - Unit 2	UM II - TOTAL
Unipolar	n	7	1	2	0	10	41	4	3	48
	%	77.78	100.00	100.00	0.00	83.33	82.00	100.00	100.00	84.21
Bipolar	n	2	0	0	0	2	9	0	0	9
	%	22.22	0.00	0.00	0.00	16.67	18.00	0	0	15.79
Total	n	9	1	2	0	12	50	4	3	57

TABLE 5.19. Absolute and relative frequencies of truncations.

5.2.2.12 Retouched Pieces

This class makes up the largest proportion of all UM assemblages (Figure B-11). The class is amorphous and consists of any retouched lithic. The degree and type of retouch within the class varies significantly. No subdivisions other than the kind of blank are made. Retouched flakes are the dominant sub-type among the retouched pieces, with bladelets and blades second and third most frequent types (Table 5.20). In publications on LN lithic assemblages the proportions each sub-type seldom are reported. Table 5.21 summarize the relative frequency of the retouched pieces sub-types in the formed tool

collections from UM I and II. Contrary to the UM collections, retouched blades constitute 27.3 % (n=550) and flakes make up 12.5 % (n=252) of the total LN assemblage at Dhuweila (McCartney and Betts 1998: 94). Retouched pieces comprise between 32 % and 34 % of the formed tools at UM, while nearly 50% of the formed tools at Dhuweila are retouched pieces.

	UM I Surface		UM I Unit 3		UM I Unit 4		UM I Unit 5		UM I TOTAL		UM II Surface		UM II Unit 1		UM II Unit 2		UM II TOTAL	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Blade	42	23.60	1	8.33	2	9.09	1	5.56	46	20.00	30	7.79	5	6.25	1	2.17	36	7.05
Bladelet	47	26.40	1	8.33	2	9.09	3	16.67	53	23.04	97	25.19	10	12.50	5	10.87	112	21.92
Flake	54	30.34	8	66.67	11	50.00	11	61.11	84	36.52	135	35.06	37	46.25	28	60.87	200	39.14
Chip	6	3.37	0	0.00	3	13.64	0	0.00	9	3.91	20	5.19	5	6.25	2	4.35	27	5.28
Chunk	1	0.56	0	0.00	1	4.55	0	0.00	2	0.87	18	4.68	1	1.25	1	2.17	20	3.91
CTE	9	5.06	1	8.33	1	4.55	1	5.56	12	5.22	10	2.60	7	8.75	0	0.00	17	3.33
Spall	4	2.25	0	0.00	1	4.55	0	0.00	5	2.17	39	10.13	2	2.50	1	2.17	42	8.22
Primary Element	14	7.87	1	8.33	1	4.55	2	11.11	18	7.83	36	9.35	12	15.00	7	15.22	55	10.76
Misc.	1	0.56	0	0.00	0	0.00	0	0.00	1	0.43	1	0.26	1	1.25	1	2.17	3	0.59
Total	178		12		22		18		230		386		80		46		512	

TABLE 5.20. Absolute and relative frequency of retouched pieces subtypes.

Subclass	UM I – Total %	UM II – Total %
Ret. Blade	6.42	2.38
Ret. Bladelet	7.39	7.40
Ret. Flake	11.72	13.22
Ret. Chip	1.26	1.78
Ret. Chunk	0.28	1.32
Ret. CTE	1.67	1.12
Ret. Spall	0.70	2.78
Ret. Primary Element	2.51	3.64
Ret. Miscellaneous	0.14	0.20
Total % of Formed Tools	32.08	33.84

TABLE 5.21. The relative frequency of retouched pieces subtypes.

5.2.2.13 Utilized Pieces

The utilized pieces class is not included in McCartney and Betts' typology (1998). Utilized pieces make up a significant portion of the UM collection. While these artifacts are

not retouched into specific shapes, such as scrapers, they do show evidence of use, such as chipped or dulled edges. Utilized pieces constitute 28.3 % of the formed tools at UM I and 14.5 % of the formed tools at UM II. Table 5.22 summarizes the relative frequencies of the subtypes of utilized pieces. Utilized blades are most frequent at both UM I and II.

	UM I Surface % (n = 148)	UM I Unit 3 % (n = 19)	UM I Unit 4 % (n = 24)	UM I Unit 5 % (n = 12)	UM I TOTAL % (n = 203)	UM II Surface % (n = 148)	UM II Unit 1 % (n = 38)	UM II Unit 2 % (n = 33)	UM II TOTAL % (n = 219)
Blade	22.30	5.26	20.83	25.00	20.69	6.08	0.00	0.00	4.11
Bladelet	52.70	15.79	4.17	50.00	43.35	33.11	34.21	30.30	32.88
Flake	18.92	57.89	33.33	0.00	23.15	15.54	42.11	39.39	23.74
Chip	0.00	0.00	0.00	0.00	0.00	2.03	5.26	3.03	2.74
Chunk	0.00	0.00	0.00	0.00	0.00	0.68	2.63	3.03	1.37
CTE	2.70	5.26	0.00	0.00	2.46	2.03	5.26	0.00	2.28
Spall	0.68	5.26	0.00	0.00	0.99	35.14	5.26	3.03	25.11
Primary Element	2.03	10.53	37.50	25.00	8.37	5.41	2.63	15.15	6.39
Miscellaneous	0.68	0.00	4.17	0.00	0.99	0.00	2.63	6.06	1.37

TABLE 5.22. Relative frequency of utilized pieces subtypes.

The proportion of utilized lithics varies from site to site. In the 1983-1985 seasons at 'Ain Ghazal utilized pieces constituted 15.1 % (n=115) of the LN formed tools, while at Wadi Shu'eib they only accounted for under 5 % (n=21) (Simmons et al. 2001: 11; Rollefson and Simmons 1988: 406). Comparisons cannot be made with either Dhuweila or Sha'ar Hagolan because these data were not reported (McCartney and Betts 1998; Stekelis 1972).

5.2.2.14 Geometrics, Microliths, and Paleolithic Tools

While not included in McCartney and Betts' typology, geometrics, microliths, and Paleolithic tool classes were utilized in the analysis of the UM chipped stone collection

because of the mixed nature of the surface collection at UM I. Geometrics and microliths were classified according to Bar-Yosef's Epipaleolithic typology (1970). Paleolithic tools were identified using Bordes typology (1961). Ten geometric microliths, 12 microliths, and 26 Paleolithic formed tools were identified in the UM I surface collection totaling 6.7 % of the total formed tools from the site. A single geometric microlith, a trapeze, was recorded among the UM II surface collection. The number of Epipaleolithic and Paleolithic formed tools in the UM I surface collection attests to the high degree of mixing in this collection.

5.2.2.15 Other

This class is composed of the chipped stone artifacts that are not categorized by the formed tool types discussed above. Because of the lack of definition of this class, comparisons are not possible. Three tool types are represented in this class: adzes, choppers, and hammerstones. One adze was identified in the surface collection from UM II. A single chopper and three hammerstones were identified in the UM I surface collection.

5.2.3 *Summary of the Chipped Stone Collections*

While the chipped stone collections from UM I and II are unique, they share several characteristics. All collections are dominated by high proportions of formed tools. Within the debitage class, flakes are the most common type. The low number of arrows and sickles at UM I and II is significant because these tool types often are used as indicators of economy, hunting and agriculture, respectively. The lack of both arrows and sickles may indicate that a third subsistence strategy occurred, such as pastoralism. The frequencies of these formed tools at UM I and II is similar to many burin sites, where pastoralism is

avored as a subsistence strategy over cereal agriculture and hunting. Tile knives also are found in low numbers and their presence, while not associated with a specific economic function, is in accordance with other LN lithic assemblages. Retouched pieces, which take less effort and skill to produce than many other formalized tool types such as tile knives and scrapers, are the most frequent formed tool type in all UM collections and within this class retouched flakes are most common. This shift to expedient lithic technology is noted by Siggers (1997) in his analysis of LN chipped stone assemblages.

In general, the chipped stone artifacts from the excavated units at UM I do not show any remarkable frequencies with respect to either debitage or formed tool types. Definite concentrations of particular types of formed tools and debitage can be recognized when the individual units are examined. Unit 4 demonstrates high numbers of awls and drills. It is possible that Unit 4 could represent an activity area where awls and drills were needed, such as bead production or leather working. No other artifacts that could substantiate this theory were found. Unit 5 also showed moderate proportions of awls, but no drills. In Unit 3, the reverse is true as more drills than awls were recorded.

The chipped stone collection from the surface at UM I is extremely varied, including debitage and formed tools characteristic of Paleolithic, Epipaleolithic and Neolithic assemblages. This fact precludes meaningful interpretations regarding the frequencies of particular tool and blank types, other than to say that the assemblage is not comparable to the three other UM collections.

The collections from each unit at UM II have fairly uniform distributions of debitage and formed tool types, although Unit 1 has 14 % ($n=70$) more lithics than Unit 2. Unit I demonstrates slightly higher numbers of CTEs and debris among the debitage types and almost double the number of retouched pieces and more than double the amount of

burins than Unit 2. These proportions may reflect indoor and outdoor activity areas. The collection from the units at UM II has higher proportions of burins and retouched pieces and lower frequencies of awls, drills, and utilized pieces as compared with the excavated collection from UM I.

The surface collection at UM II is noted for its high proportion of formed tools. Among the debitage classes, flakes and debris are recorded in moderate proportions, while CTEs and cores are in low proportion. This collection is unique because burins are the second most frequent tool type, followed closely by utilized pieces and awls. Unlike UM I, the surface chipped stone collection at UM II is homogeneous and appears to represent a single period, the Late Neolithic. With the exception of the high numbers of burins, this collection is quite similar to the collection from the excavated units at UM II.

At UM, like most LN sites, flakes are used in preference to lamellar blanks. The debitage classes of the UM collections are similar to Dhuweila, with the exception of higher proportions of blades and bladelets at the former (McCartney and Betts 1998: 61). The collections from UM II have significantly lower proportions of debitage in contrast to Wadi Shu'eib and 'Ain Ghazal where debitage accounts for 95 % and 93 %, respectively (Simmons et al. 2001: 10; Rollefson and Kafafi 1994: 25-26). This may indicate that primary reduction occurred off site or in an area of the site not yet investigated.

Comparisons with other LN sites are difficult due to the use of different lithic typologies. This is not the case with arrows and burins, for which the typologies are established. The formed tool groups at Dhuweila are distinctly different from any of the collections at UM, where the frequency of arrows is very high (McCartney and Betts 1998: 94). The differences between the formed tools at UM and Dhuweila is explained most reasonably by different subsistence strategies, whereby the latter is reliant on hunting. The

arrows at Wadi Shu'eib, while in low proportion, are much more frequent in the chipped stone assemblage than at UM (Simmons et al. 2001: 11). The frequency of projectile points at 'Ain Ghazal remains significantly higher than at UM.

The frequency of burins in the LN assemblage at Wadi Shu'eib, although slightly higher, are most similar to the proportions recorded in the UM II excavated collections. The proportion of burins at UM I is most similar to the 1992 season at 'Ain Ghazal, where burins accounted for 5.2 % and made up 4.2 % of the total formed tools (Rollefson and Kafafi 1994: 26). The frequency of burins in the UM II surface collection is similar to both the 1983-1983 seasons at 'Ain Ghazal and the LN collection at 'Dhuweila (Rollefson and Simmons 1988: 406; McCartney and Betts 1998: 94).

To summarize, the analysis of the chipped stone assemblages from UM I and II indicates both sites are LN. This was established using comparative typology with known sites, as well as Gopher's (1994) seriation analysis of arrows. Particular indicators within the assemblages were the ha-Parsa points and tile knives found at both sites. In addition, the debitage classes from both sites were flake-dominated, as seen in most LN sites. Indications of the tradition affiliation of each site could not be determined. This is due, in part, to the lack of this type of research for the LN period. Although the proportions of formed tool types at UM I and II differ from each other, the occupants of both sites shared the same lithic technology because the same elements appear at each site. These artifacts, when placed side by side, are virtually indistinguishable from each other. The analysis of the chipped stone assemblages indicate that the surface collection from UM I is mixed, with artifacts from the Paleolithic, Epipaleolithic, and Neolithic periods represented. Unlike UM I, the surface collection at UM II has little intrusive material and the proportions of formed tools reflect those of the excavated collection. This suggests the surface and excavated

collections at UM II belong to a single assemblage. The data did demonstrate that while UM II has a high frequency of burins as compared to other formed tool types, it does not have the proportions to be classified as either a burin site or a LN station.

5.3 THE POTTERY COLLECTION

The UM pottery collection consists of 47 pottery sherds. While this collection is small, important information can be gained from it. Since the early 19th century, pottery typology has been a key method of relative dating through seriation. Pottery seriation continues to play a major role in the archaeology of the southern Levant and classification schemes are continuously being revised. The pottery collection from UM I and II was classified using the LN ceramic typology outlined by Garfinkel (1999) in his analysis of Neolithic and Chalcolithic pottery of the southern Levant. While numerous reference guides exist for pottery of Israel and Jordan, the Neolithic period is only briefly discussed (see Hendrix et al. 1996; Homes-Fredericq and Franken 1986; Amiran 1963). Many LN researchers including Banning (1998) and Kafafi (1990, 1995) discuss elements of LN pottery collections; however, Garfinkel is the only researcher to amalgamate the pottery collections from numerous LN sites. As discussed in the preceding chipped stone section, it is very difficult to compare assemblages where different typology or terminology has been used. Analyses of LN pottery assemblages are found in numerous site reports, but Garfinkel's analysis brings this data together making it simpler to evaluate the different attributes of each LN tradition. Because Garfinkel (1999) reanalyzed the pottery assemblages from numerous LN sites, his analysis is the most comprehensive as well as being the most recent. Garfinkel's (1999) analysis of LN pottery will be used as the main reference guide for the analysis of the pottery collections from UM I and II.

Table 5.23 demonstrates the absolute and relative frequencies of sherds within each excavated unit, as well as the surface collection from UM I. The surface collection makes up over half of the total pottery sherds collected from both UM I and II. As discussed in Chapter 4 (Section 4.3), Units 4 and 5 were placed inside and outside what appears to be a corner of a building at UM I. Units 1 and 2 at UM II were also placed outside and inside of a circular structure at UM II. Table 5.23 shows that more pottery was found on what is considered the outside of the structure at UM I and just the opposite is true at UM II. Further excavation is needed to see if these tendencies continue at each site.

Ware	Coarse		Medium		Fine		Total Sherds	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
UM I - Surface	0	0.00	22	91.67	2	8.33	24	51.06
UM I - Unit 3	0	0.00	2	100.00	0	0.00	2	4.26
UM I - Unit 4	0	0.00	2	100.00	0	0.00	2	4.26
UM I - Unit 5	3	50.00	3	50.00	0	0.00	6	12.77
UM II - Unit 1	0	0.00	1	50.00	1	50.00	2	4.26
UM II - Unit 2	0	0.00	5	45.45	6	54.55	11	23.40
Total Coarse Type	3	6.38	35	74.47	9	19.15	47	100

Table 5.23. Absolute and relative frequencies of sherds and ware types.

The pottery from the excavated units was heavily encrusted with carbonate on one side and clay on the opposite side. Because of the highly friable nature of the pottery and the delicacy of the paint or slip, the pottery could not withstand washing. Not only did this create problems in the analysis of the decoration, but also in the examination of the ware. The carbonate and clay was scraped off a section of each sherd to expose the fabric and decoration. This technique is damaging to the sherd and, in many cases, the paint or slip cannot be saved. Evidence of mat or straw impressions may also be destroyed. This procedure was successful in many ways, exposing beautifully painted decorations and

allowing a glimpse of the ware. In cases where this method proved to be damaging to the sherd, only a small portion of the sherd was cleaned.

5.3.1 Ware

A great deal of variety exists among the ware types in the UM pottery collection. Some sherds are extremely coarse and very friable, while others are finely made. As demonstrated by Table 5.23 medium ware is most common in all collections, except in Unit 2 at UM II. At this point, no conclusions can be made regarding the pattern as to the distribution of ware types at UM I and II; however, some observations can be noted. Coarse pottery is found only in Unit 5 at UM II. Medium ware pottery is found along with very fine pottery. Garfinkel (1999: 16) notes that this variety of ware types is a common feature in LN pottery assemblages. A higher proportion of fine ware was recorded at UM II.

Both the coarse and moderately coarse pottery generally exhibits a reddish yellow fabric. The fabric of the fine ware is buff colored, which translates to pink in the Munsell soil color charts. The fine ware has very few inclusions, while the coarser sherds have chaff and lime temper. Two examples have small pebble inclusions and one sherd has small quartzite fragments. Several sherds were straw wiped either on the exterior or interior.

Diagnostic pieces are relatively rare in this collection. Only four rim pieces are present in the collection and no bases have been identified. Three rim sherds of fine ware were recorded in Unit 2 at UM II and one rim was identified in the UM I surface collection. According to Garfinkel's (1999: 39) classification of rim types, all rim sherds at UM are considered to have even side width rims, rather than widening rims. The three sherds from Unit 2 at UM II demonstrate pointed rims, while the sherd from UM I has a square rim.

Two handles were recorded in the UM I surface collection. One handle is classified as a loop handle (Figure B-12). In LN assemblages, loop handles are found on a variety of vessels including small and large chalices, deep decorated and undecorated bowls, large bowls, and an assortment of jars (Garfinkel 1999: 58). Unfortunately, there is no indication as to the type of vessel to which this loop handle belonged. The second handle is categorized as a horizontal, rounded, pierced lug handle (Figure B-13, B-14). Lug handles are found on pots, pithoi, and holemouth jars (Garfinkel 1999: 58). Unlike the handle described above, the sherd that this handle is attached to also retains a diagnostic characteristic - a horizontal ridge above the handle. This ridge would have encircled the vessel just below the neck. Both the handle and ridge identify this artifact as a sherd of a Byblos jar (Figure A-1). According to Garfinkel (1999: 50) this is a relatively rare vessel type that has been found at Yarmoukian sites including Munhata and Nahal Qanah Cave.

Although not truly diagnostic, several sherds have slips on the interior surface. This indicates that the sherds came from open shaped vessels as it is likely that decoration only would occur where it could be viewed. Numerous open shape vessels of various sizes are common in the LN period including bowls, chalices, spoons, pots, basins and pithoi (Garfinkel 1999: 21). Red slip or paint is found on a variety of vessel types (see Section 5.2.2 below). The majority of the sherds, however, are amorphous body sherds that do not have characteristics indicative of a particular vessel type.

5.3.2 *Decoration*

Over half of the sherds collected demonstrated some type of decoration including slip, paint, incision, burnishing or a combination of these techniques. This occurrence of decoration is unique because, as noted in Chapter 3 (Section 3.4.4.1) decorated sherds

usually account for a small portion of LN pottery assemblages. However, as mentioned previously the sample size is very small. As Table 5.24 demonstrates, red slipped or red painted sherds are most common.

Decoration Type	Red Slipped or Red Painted	Wide Painted Lines	Incised Herringbone Pattern	Frames	Red Slip and Burnish	Painted Decoration	Other	Total Decorated Sherds
	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>
UM I - Surface	1	0	1	1	1	2	0	6
UM I - Unit 3	1	0	0	0	0	0	0	1
UM I - Unit 4	1	0	0	0	0	1	0	2
UM I - Unit 5	2	0	0	0	0	1	0	3
UM II - Unit 1	1	0	0	0	0	0	1	2
UM II - Unit 2	4	5	0	0	0	0	0	9
Total Decoration Type	10	5	1	1	1	4	2	23

Table 5.24. Absolute frequency of decoration types.

Three sherds from UM I have paint on a portion of the sherd (Figure B-15). The red paint (10R5/6) on the first sherd is poorly preserved and no design can be determined. The second sherd has two red painted (10R4/8) areas across the bottom. The sherd is of medium quality fabric and like the painted sherds from UM II the fabric is pink (5YR7/4). Like the first painted sherd, this sherd is too fragmentary to determine a pattern. The final painted sherd was described above as a sherd of a Byblos jar (Figure B-13). This sherd demonstrates an inverted reddish brown (2.5YR5/4) painted triangular design that comes to a point just below the center of the lug handle. A painted band meets the tip of the triangle, but because of the fragmentary nature of the artifact, it cannot be determined what the bottom painted design is. Garfinkel (1999: 77, Photo 44) recorded a similar decoration technique in the Jericho IX assemblage, although the triangular motif is common throughout all LN pottery traditions. Painted designs are found in all LN ceramic traditions. At 'Ain Ghazal it was noted that painted sherds were more common in the

earlier Yarmoukian phases, only to be replaced by a dominance of incised decoration in later phases (Kafafi 1995: 456).

Several sherds have either paint or slip of varying colors of red covering the entire surface (Figure B-15). Because of the size of the sherd it is impossible to determine if the vessel was decorated with slip or a painted design. This type of decoration is generally only found on small bows and cups, deep decorated bowls, large chalices, Jericho IX jars and large bowls (Garfinkel 1999: 59). Because red slip and red paint are common in all LN pottery assemblages (Garfinkel 1999), these decorated sherds are not indicative of a particular LN tradition.

A common form of LN ceramic decoration is painted lines, sometimes forming a geometric pattern (Figure 3.3a). Wide painted lines are defined as being over 0.5 cm in width, as opposed to narrow painted lines that are less than 0.5 cm in width (Garfinkel 1999: 61). Five sherds with wide painted lines were identified in Unit 2 at UM II. Four sherds were mended to form a single sherd, resulting in two moderately sized sherds, one from Unit 1 and the other from Unit 2 (Figure B-16). Both sherds have pointed rims and fine pink fabric (7.5YR8/4). Sherds WT96-200-12, 13, 14, 15 exhibit yellowish red paint (5YR5/6) and the painted decoration on sherd WT96-200-16 was done in red paint (2.5YR5/6). In addition to the wide painted lines, a thin line also encircles the rim of the sherds. A third sherd from Unit 1 at UM II may also show this decoration as it is made of the same fabric and has the same color of red paint, but it could not be properly cleaned. For the purpose of this analysis, this sherd was not considered in this decoration type, but was included with the red paint and red slipped sherds. This sherd was found in locus 1 of Unit 1. Wide painted motifs were not identified in the pottery collection from UM I.

Wide painted lines are usually found on Jericho IX jars, deep decorated bowls and handleless jars. Both sherds exhibiting this decoration are also rim sherds. The curvature on the rim and sherds indicates they did not belong to jars, but to deep decorated bowls (Figure A-2). One sherd also exhibits a slipped interior, further demonstrating the original vessel was an open shape. While Garfinkel only specifically identifies wide painted line decorated sherds in the Yarmoukian tradition, Figures 43 and 63 (Garfinkel 1999: 74, 98) demonstrate that this decoration type also was found in the Jericho and Nizzanim assemblages. A similar decoration technique was identified in the upper Yarmoukian strata at 'Ain Ghazal. In this case, the wide painted lines also appeared on fine ware, but unlike at UM II, the sherds from 'Ain Ghazal were burnished (Kafafi 1995: 547).

A single sherd from the surface collection at UM I demonstrates herringbone-incised decoration inside an incised frame (Figure B-17). This type of decoration is a component of Sha'ar Hagolan decoration, which is most commonly attributed to the Yarmoukian tradition. Sha'ar Hagolan decoration is mainly found on small bowls and cups, miniature and small jars, and Sha'ar Hagolan jars (Garfinkel 1999: 62). Incised herringbone designs within incised frames, however, are found also in the Jericho IX tradition where this decoration technique appears on deep decorated bowls, hemispherical bowls, medium-sized jars, and pithoi (Garfinkel 1999: 95). Because the sherd from UM I is very small, vessel type cannot be determined. Nor can it be determined if it was part of Sha'ar Hagolan decoration.

A sherd was identified in the surface collection from UM I that shares characteristics with the incised parallel lines or frame decoration (Figure B-17, Figure 3.3). This sherd has a single incised line and either red paint or slip (2.5YR5/6) was applied below this line. This decoration technique is generally found on the same vessel types that

herringbone incision occurs on (Garfinkel 1995: 62). The ventral side of the sherd is relatively rough, suggesting that the sherd is not from an open vessel, but a closed vessel such as a jar. Incised frames appear in Jericho IX and Yarmoukian assemblages (Garfinkel 1999).

A single burnished sherd was identified in the surface collection from UM I (Figure B-17). The burnishing appears on either reddish yellow paint or slip (5YR6/6). Burnishing is associated with the Jericho IX tradition where it appears on Jericho IX jars (Garfinkel 1999: 95). The sherd, however, has no other distinguishing characteristics and thus, vessel type cannot be identified. Although Garfinkel (1999: 59-67) does not indicate that burnishing is a decoration technique associated with the Yarmoukian tradition he does make reference to five burnished vessels from Megiddo, Sha'ar Hagolan, and Nahal Qanah Cave. In addition, a small amount of burnished pottery was identified at 'Ain Ghazal, a site characterized as Yarmoukian (Kafafi 1995: 552). In the pottery assemblage at 'Ain Ghazal, burnishing made its first appearance in the Middle Phase of the Yarmoukian occupation and became dominant during the Last Phase (Kafafi 1995: 552). While burnishing is more common in Jericho IX assemblages, the presence of the burnished sherd in the collection from UM I is not sufficient to identify tradition.

In Unit 1 at UM II, a very unique sherd was recovered. This sherd demonstrates what appears to be either white paint or white slip (10YR8/1) on a very pale brown fabric (10YR8/2) (Figure B-18). The initial assessment of this sherd that it was like the pale slip characteristic of Jericho IX pottery, but pale slip is not white; instead it is a creamy pink color (Garfinkel 1999: 95). No analogies to this sherd were identified in Garfinkel's (1999) analysis of LN pottery. It is possible that this sherd is intrusive or not otherwise attested.

5.3.3 *Summary of the Pottery Collection*

To summarize, the pottery from UM is very similar to pottery found at most LN sites. The collections share similar ware types and decorations, although there is a higher proportion of fine ware at UM II. In addition, the wide painted line decoration technique is only found at UM II. While few diagnostic sherds are present in the collection, they show a range of similarities with all of the traditions as designated by Garfinkel (1999). While the Byblos jar has only been identified in Yarmoukian assemblages, its decoration is very similar to Jericho IX styles. Incised sherds common in the Yarmoukian tradition are found at UM I, but they are also found at Jericho IX sites. Burnishing, although more common in Jericho IX assemblages, is also attested at numerous Yarmoukian sites. Like the ceramic assemblages from many LN sites, the pottery collections at both UM I and II show affinities with all of the LN pottery traditions. Because of the small sample size and the condition of the sherds, the tradition cannot be assigned. It must be acknowledged, however, that a larger pottery collection from UM I and II may not show higher frequencies of either typical Yarmoukian or Jericho IX decoration techniques. UM I and II are located roughly equidistant from both Yarmoukian (Wadi Shu'eib) and Jericho IX (Ghrubba) sites (Figure 1.1). It is possible that UM I and II may represent transitional sites with characteristics of both the Yarmoukian and Jericho IX tradition.

CHAPTER 6

SUMMARY AND CONCLUSION

As discussed in Chapter 1, the goal of this thesis was to examine the lithic and pottery collections from UM I and II in terms of the following questions.

1. Are the initial interpretations of the sites, that UM I is a Yarmoukian site and UM II a burin site, correct?
2. Does a relationship exist between the excavated and surface collected material at each site?
3. Are there any similarities between the collections from UM I and II?
4. Do the UM collections show analogies to other sites?
5. Are the collections indicative of a particular LN tradition?

The following will summarize these relationships based on information from the analysis of the lithic and pottery collections.

The analysis of the lithic material best clarifies the relationships between the surface and excavated collections. This is due largely to the small amount of pottery collected from the surface and excavations at UM I and because no pottery was recovered during the surface collection at UM II. The chipped stone artifacts at UM I clearly indicate the mixed nature of the collection. Although artifacts consistent with the LN were identified, including burins on concave truncation and a tile knife, Paleolithic and Epipaleolithic lithics were also

identified. A number of artifacts in the surface collection from UM I are not diagnostic and could belong to any period. The highly mixed nature of the surface collection from UM I requires that it not be considered a single assemblage. This is not the case at UM II.

Although UM II is quite deflated, the surface collection shows little intrusive material. In addition, the distribution of lithics on the surface is mirrored in the test probes, where the density of artifacts is higher just outside the circular structures. In the analysis of the proportions of the formed tools in both the surface and excavated assemblages at UM II, it was noted that the surface collection had higher proportions of burins and lower proportions of retouched and utilized pieces as compared with the excavated collection. It is very likely that these minor differences are not due to unrelated assemblages, but rather the judgemental method of collection. Thus, both the surface collection and excavated material appear to belong to a single assemblage at UM II.

Many similarities and differences exist between the collections at UM I and II. Both sites have pottery collections characteristic of the LN period. The ware from both sites exhibits similar colors, which is likely due to the use of local clays. The medium and fine ware from both sites is virtually indistinguishable, except for the fact that fine ware is much more common at UM II and is decorated with red-painted wide lines. This decoration motif does not appear in the UM I collection. In addition, decoration techniques found in the UM I collection (herringbone incision, frames) are not found in the UM II collection. These, however, are relatively minor differences. As a great deal of variety exists in the decoration and ware of ceramic collections within LN sites, it is safe to conclude that the UM I and II pottery collections are similar. In addition, the sample size is very small.

Comparisons between the chipped stone collections at UM I and II can be made, with the exception of the surface collection from UM I for reasons outlined above. One

must keep in mind that the UM I excavated lithic collection consists of 457 artifacts, whereas the UM II surface collection has more than triple that number. Flakes dominate the debitage classes from both sites, and both sites have high proportions of formed tools. Among the formed tool classes, both sites exhibit LN ha-Parsa points, tile knives, and burins. Burins are much more prevalent at UM II and awls and drills are found more frequently at UM I. This is significant as many drills are produced on burin spalls.

To summarize, the pottery and chipped stone collections from UM I and II are very similar. While the pottery and lithic collections from UM I and II are not sufficient to indicate if the sites were occupied at the same time, it is clear that the occupants of the two sites shared the same technologies. This suggests that the sites were occupied within a similar time frame. In addition, the lithic assemblages may reflect a different subsistence strategy at each site. As mentioned in Chapter 3, burins sites are associated with pastoralism. Although UM II does not have the proportion of burins to be categorized as a burin site, it does have significantly more burins than at UM I. This fact may suggest that different subsistence strategies occur at each site. It is possible that each site may represent a seasonal occupation. The Bedouin who currently occupy the area use UM II and the surrounding upland area during the summer months and live in tents. During the winter months, they move just over one kilometer north where a small settlement has been established on a terrace not unlike that on which UM I lies.

UM I and II are similar in many ways to other LN sites. The pottery is similar to examples found at Jericho, Sha'ar Hagolan and numerous other LN sites (Garfinkel 1999). But because the collection from UM I and II is so small any meaningful comparisons between frequency of vessel or decoration type is impossible. The lithic collection shows characteristics comparable to many other LN sites, such as the domination of flakes among

the debitage classes. The low number of arrows at UM I and II distinguishes these sites from the hunting camp, Dhuweila, where arrows are one of the foremost tool classes (McCartney and Betts 1998: 94). It is clear that inhabitants of UM I and II did not rely heavily on hunting. Low frequencies of arrows are also recorded at Wadi Shu'eib (Simmons et al 2001: 11). The proportion of burins at UM I is similar to the 1992 season at 'Ain Ghazal, although most other seasons recorded higher frequencies (Rollefson and Kafafi 1994: 26). The proportion of burins at UM II, while not high enough to be considered a burin site, is similar to frequencies at Wadi Shu'eib, the 1983-1985 seasons at 'Ain Ghazal, and Dhuweila (Simmons et al. 2001: 11; Rollefson and Simmons 1988: 406; McCartney and Betts 1998: 94). Thus, while UM I and II share similarities with many LN sites, no exact parallels can be found. The similarities with 'Ain Ghazal and Wadi Shu'eib are notable because different typologies were used. If the 'Ain Ghazal model was used, the similarities may have been more striking. As stated previously, "the events that transpire at one or two settlements need not reflect the general pattern of human settlement in a given region" (Rollefson 1996: 220). In retrospect, it seems fairly unreasonable to assume that there will be remarkable similarities in the proportions lithic classes and pottery decoration types when comparing sites. This is because there are numerous variables, such as economy, environment, seasonality, and even the size of the site, that can effect how people lived. The fact that UM I and II do show similarities to 'Ain Ghazal and Wadi Shu'eib does suggest that the occupants of these sites shared similar ways of life.

The artifacts recovered from UM I and II are typical of several LN traditions. Presently, LN traditions are assigned based primarily on pottery typology. The ceramic collections at UM I and II are not particularly diagnostic of one tradition or another. Instead, they have characteristics of all LN pottery traditions. The lithic collection,

although much larger than the pottery collection, provides even less clarity. In the current research of the Late Neolithic period in the southern Levant no effort has been directed towards identifying traditions within lithic collections. Thus, the combination of the lithic and ceramic collections at UM cannot pin point a specific tradition, but do securely categorize these sites as Late Neolithic.

Through the analysis of the lithic and pottery collections, I conclude that the initial interpretations of the site are not substantiated. As mentioned above, the pottery collection does have sherds that exhibit decoration found in the Yarmoukian tradition, but these decoration styles are also found in other LN traditions. A single sherd was identified with burnished slip, a characteristic decoration style of the Jericho IX tradition that is not common in the Yarmoukian tradition. But tradition cannot be determined on a single sherd. UM II was initially believed to be a burin site because of the high number of burins, but the actual analysis showed that burins constituted a much smaller portion of the total formed tools than was first believed. With this fact in mind, UM II cannot be characterized as a burin site.

Although this thesis did not prove that UM I and II were either Jericho IX or Yarmoukian sites, I will remind the reader of the statements made in Chapter 1; Umm Meshrat I and II have the potential to be very important to Late Neolithic research. If one or both sites are determined to belong to the Jericho IX tradition, it would greatly increase the current knowledge about this tradition. Currently less than 10 Jericho IX sites have been identified (Garfinkel 1999b: 10). If the sites are determined to be Yarmoukian, it would attest the furthest south that a Yarmoukian campsite(s) has been identified. In addition, the Yarmoukian tradition has only been identified at some 20 Late Neolithic sites (Garfinkel 1999b: 10). Regardless of the identification of tradition, any information gained

from the analysis from Umm Meshrat I and II will significantly add to the body of Late Neolithic research.

While the conclusion of this analysis is not definitive, one must keep in mind that the 2001 season at Umm Meshrat I and II was preliminary. It is my hope that this thesis will serve as a foundation for the future excavations at UM I and II, which are expected to resume in the summer of 2003. Although not intended, this thesis highlighted some of the problems of defining Late Neolithic traditions and demonstrated the need for more research on the Late Neolithic period.

There is a great deal of overlap among the LN ceramic traditions and it appears that distinctions based solely on the proportions of ceramic types are arbitrary. This is especially true when considering the fact that the wares and vessel forms are indistinguishable among the traditions. Art objects are also used as indicators of tradition: Yarmoukian sites have art objects and Jericho IX sites do not. The research for this thesis demonstrated that numerous Yarmoukian sites do not have art objects. Denticulated sickle blades are generally considered the third indicator of the Yarmoukian tradition. This particular tool type is found in the periods preceding and following the LN period.

With all of these *indicators* of LN traditions, one assemblage type has escaped serious consideration - the chipped stone. In the analysis of the preceding periods, chipped stone assemblages defined industries and culture groups, such as the Natufian in the Epipaleolithic period. It appears that the LN pottery assemblages have taken center stage. I feel that the chipped stone assemblages from LN sites may be the 'missing link' for identifying LN traditions. Thus, I plan to pursue this issue as the subject of my doctoral work. As noted throughout Chapter 5, there are considerable differences in LN lithic typology. This makes the re-examination of LN lithic collections a challenge and requires

that the artifacts be re-classified using the same typology. This research will provide a useful tool through which LN sites can be compared. Only when the chipped stone collections from these sites can be compared in this manner will it be determined if lithics can be used to help determine LN tradition.

REFERENCES CITED

Al-Hunjul, N.

- 1995 *The Geology of the Madaba Area: Map Sheet (3153-II)*. Geological Mapping Series Geology Bulletin 31. Geology Directorate, Geological Map Division, Natural Resources Authority: Amman.

Amiran, R.

- 1963 *Ancient Pottery of the Holy Land: From its Beginnings in the Neolithic Period to the End of the Iron Age*. Massada Press Ltd.: Israel.

Banning, E. B.

- 1993 Where the Wild Stones Have Been Gathered Aside: Pastoralist Campsites in Wadi Ziqlab, Jordan. *Biblical Archaeologist* 56/4: 212-221.
- 1995 Herders or Homesteaders? A Neolithic Farm in Wadi Ziqlab, Jordan. *Biblical Archaeologist* 58/1: 2-13.
- 1998 The Neolithic Period: Triumphs of Architecture, Agriculture, and Art. *Near Eastern Archaeology* 61/4: 188-237.
- 2001 Review of *Neolithic and Chalcolithic Pottery of the Southern Levant*, by Garfinkel, Y. *Bulletin of the American Schools of Oriental Research* 322: 79-81.

Barkai, R. and Gopher, A.

- 1999 The Last Neolithic Flint Industry: A Study of Technology, Typology and Social Implications of the Lithic Assemblage from Nahal Zehora I, a Wadi Rabah (Pottery Neolithic) Site in the Menashe Hills, Israel. *Mitekufat Haeven* 29: 41-122.

Bar-Yosef, O.

- 1970 *The Epipaleolithic Cultures of Palestine*. PhD thesis submitted to the Senate of the Hebrew University, Jerusalem.

- Bartlet, J.
 1983 *Jericho: Cities of the Biblical World*. William B. Eerdmans Publishing Company: Grand Rapids, Mi.
- Baruch, U. and Bottema, S.
 1991 Palynological Evidence for Climate Changes in the Levant ca. 17,000-9,000 BP. In Bar-Yosef, O. and Valla, F. (eds.), *The Natufian Culture in the Levant*, 11-20. International Monographs in Prehistory, Archaeological Series 1. Ann Arbor, Mi.
- Betts, A.
 1982 Prehistoric Sites at Qa'a Mejalla, Eastern Jordan. *Levant* XIV, 1-34.
 1987 Recent Discoveries Relating to the Neolithic Periods in Eastern Jordan. In Hadidi, A. (ed.), *Studies in the History and Archaeology of Jordan III*, 225-230. Department of Antiquities, and Routledge and Kegan Paul: Amman.
 1988 The Black Desert Survey: Prehistoric Sites and Subsistence Strategies in Eastern Jordan. In Garrard, A. and Gebel, H. (eds.), *The Prehistory of Jordan: the State of Research in 1986*: 369-391. British Archaeological Reports International Series 396: Oxford.
 1989 The Pre-Pottery Neolithic B Period in Eastern Jordan. *Paléorient* 15, 1: 147-153.
 1992 Eastern Jordan: Economic Choices and Site Location in the Neolithic Periods. In: Tell, S. (ed), *Studies in the History and Archaeology of Jordan IV*: 111-115. Department of Antiquities: Amman.
 2002 Personal communication, Feb 15.
 2003 *Draft MS: Excavations and Surveys in Eastern Jordan, Vol. 2*.
- Betts, A., and Helms, S.
 1987 A Preliminary Survey of Late Neolithic Settlements at el-Ghirqa, Eastern Jordan, *Proceedings of the Prehistoric Society* 53: 327-336.
- Bordes, F.
 1961 *Typology du Paleolithique: Ancient et Moyen*. Bordeaux. 3rd ed. CNRS: Paris.
- Bottema, S.
 1987 Chronology and Climatic Phases in the Near East from 16,000 to 10,000 BP. In Aurenche, O., Evin, J., and Hours, F. (eds.) *Chronologies in the Near East*, 295-310. British Archaeological Reports International Series: Oxford.

Bottema S. and Van Zeist, W.

- 1981 Palynological evidence for the Climatic History of the Near East, 50,000-6,000 BP. In Cauvin, J. and Sanlaville, P. (eds.), *Prehistoire du Levant*, 111-132. Colloques Internationaux du CNRS No. 598. CNRS: Paris.

Butzer, K.

- 1975 Patterns of Environmental Change in the Near East During Late Pleistocene and Early Holocene Times. In Wendorf, F. and Marks, A. (eds.), *Problems in Prehistory: North Africa and the Levant*, 389-410. Southern Methodist University Press: Dallas.

Byrd, B. and Garrard, A.

- 1990 The Last Glacial Maximum in the Jordanian Desert. In Gamble, C. and Soffer, O. (eds.), *The World at 18'000 BP*, Volume 2: 78-96. Unwin Hyman: London.

Clutton-Brock, J.

- 1978 Early Domestication and the Ungulate Fauna of the Levant During the Prepottery Neolithic Period. In: Brice, W. (ed.), *The Environmental History of the Near and Middle East Since the Last Ice Age*, 29-40. Academic Press: New York.

Cordova, C.

- 1999a *Soil Erosion, Vegetation Change and Alluvial Sedimentation on the Agricultural Frontier of Central Jordan*. Report and Research Proposal. Oklahoma State University.
- 1999b Landscape Transformation in the Mediterranean-Steppe Transition Zone of Jordan: A Georarchaeological Approach. *The Arab World Geographer* 2/3: 182-201.
- 2000 Geomorphological Evidence of Intense Prehistoric Soil Erosion in the Highlands of Central Jordan. *Physical Geography* 21/6: 538-567.

Crowfoot-Payne, J.

- 1983 The Flint Industries of Jericho. In Kenyon, K. and Holland, T. (eds.), *Excavations at Jericho, V*: 622-759. The British School of Archaeology in Jerusalem: London. Referenced in Garfinkel 1993a: 130.

Daviau, M.

- 1997 Moab's Northern Border: Khirbat al-Mudayna on the Wadi ath-Thamad. *Biblical Archaeologist* 60/4: 222-228.
- 2000a A Moabite Sanctuary at Khirbat al-Mudayna. *Bulletin of the American Schools of Oriental Research* 230: 1-21.

- 2000b Survey and Excavation in Northern Moab. In Matthiae, P., Enea, A., Peyronel, L., and Pinnock, F. (eds.), *Proceedings of the First International Congress on the Archaeology of the Ancient Near East*, 279-290. Roma: Rome.
- 1995 *Excavation Manual for the Wadi ath-Thamad Archaeological Project: Wadi ath-Thamad, Jordan*. Unpublished.
- Ferguson, K. and Hudson, T.
- 1986 Climate of Tell Hesban and Area. In O. S. LaBianca and L. Lacelle, *Hesban 2: Environmental Foundations*, 7-22. Andrews University Press: Berrien Springs.
- Finlayson, B. and Betts, A.
- 1990 Functional Analysis of Chipped Stone Artefacts from the Late Neolithic Site of Gebel Na'ja, Eastern Jordan. *Paleorient* 16.2: 13-20.
- Flenniken, J., and Ozburn, T.
- 1988 Experimental Analysis of Plains Grooved Abraders. *Plains Anthropologist* 33/119: 37-52.
- Garfinkel, Y.
- 1993a The Yarmoukian Culture in Israel. *Paleorient* 19, 1: 115-134.
- 1993b Jordan Valley: Neolithic and Chalcolithic Periods In Stern, Ephraim (ed.), *The New Encyclopedia of Archaeological Excavations in the Holy Land*, 811-814. New York: Simon and Schuster.
- 1999a *Neolithic and Chalcolithic Pottery of the Southern Levant*. Qedem 39. Institute of Archaeology, Hebrew University of Jerusalem: Jerusalem.
- 1999b Radiometric Dates from Eighth Millennium B. P. Israel. *Bulletin of the American Schools of Oriental Research* 315: 1-13.
- Garrard, A., Betts, A., Byrd, B., and Hunt, C.
- 1987 Prehistoric Environment and Settlement in the Azraq Basin: an Interim Report on the 1985 Excavation Season. *Levant* 19: 5-25.
- Garstang, J., and Garstang, J. B. E.
- 1948 *The Story of Jericho*. Marshal, Morgan, and Scott: London. Referenced in Banning 1998: 206.
- Gebel, H. G., and Bienert, H. D.
- 1997 Ba'ja Hidden in the Petra Mountains. Preliminary Report on the 1997 Excavations. In Gebel, H. G., Kafafi, Z., and G. O. Rollefson (eds.) *The Prehistory of Jordan, II. Perspectives from 1997*, pp. 221-62. Studies in Early Near Eastern Production, Subsistence, and Environment 4. Ex Orient: Berlin.

- Goldberg, P.
 1981 Late Quaternary Stratigraphy of Israel: An Eclectic View. In Cauvin, J. and Sanlaville, P. (eds.), *Prehistoire du Levant*, 55-66. Colloques Internationaux du CNRS No. 598. CNRS: Paris.
- Gopher, A.
 1989 Neolithic Arrowheads of the Levant: Results and Implications of a Seriation Analysis. *Paleorient* 15.1: 47-56.
 1994 *Arrowheads of the Neolithic Levant*. American School of Oriental Research, Dissertation Series 10. Eisenbrauns: Winona Lake
 1995 Early Pottery-bearing groups in Israel-The pottery Neolithic Period. In: Levy, T. (ed.), *The Archaeology of Society in the Holy Land*: 205-225. Leicester University Press: London.
- Gopher, A. and Orrelle, E.
 1995 Yarmoukian Imagery. In Gopher, A. 1995. Early Pottery-bearing groups in Israel-The pottery Neolithic Period. In: Levy, T. (ed.), *The Archaeology of Society in the Holy Land*: 205-225. Leicester University Press: London.
 1996 An Alternative Interpretation for the material Imagery of the Yarmoukian, a Neolithic Culture of the Sixth Millennium BC in the Southern Levant. *Cambridge Archaeological Journal* 6/2: 255-79.
- Hendrix, R., Drey, P., and Storfjell, J.
 1996 *Ancient Pottery of Transjordan: An Introduction Utilizing Published Whole Forms - Late Neolithic Through Late Islamic*. Institute of Archaeology/ Horn Archaeological Museum, Andrews University: Berrien Springs.
- Henry, D. O.
 1986 The Prehistory and Paleoenvironments of Jordan: An Overview. *Paleorient* 12/1: 5-26.
- Homes-Fredericq, D. and Franken, H.
 1986 *Pottery and Potters - Past and Present: 7000 Years of Ceramic Art in Jordan*. Ausstellungskataloge der Universitat Tübingen Nr. 20. ATTEMPO Verlag Tübingen GmbH.
- Horowitz, A.
 1979 *The Quaternary of Israel*. Academic Press: Toronto.
- Kafafi, Z.
 1988 Jebel Abu Thawwab: A Pottery Neolithic Village in Jordan. In Garrard, A. and Jebel, H. (eds.), *The Prehistory of Jordan*, pp. 451-71. British Archaeological Reports 396 (ii): Oxford.

- 1990 Early Pottery Context from 'Ain Ghazal, Jordan. *Bulletin of the American Schools of Oriental Research* 280: 15-31.
- 1992 Pottery Neolithic Settlement Patterns in Jordan. In Tell, S. (ed), *Studies in the History and Archaeology of Jordan IV*: 115-123. Department of Antiquities: Amman.
- 1993 The Yarmoukians in Jordan. *Paléorient* 19/1: 101-114.
- 1995 Decorative Elements on the Excavated Neolithic Pottery at 'Ayn Ghazal. In 'Amr, K., Zayadine, E. and Zaghoul, M. (eds.), *Studies in the History and Archaeology of Jordan V: Art and Technology Throughout the Ages*. 545-554. Department of Antiquities: Amman
- Kafafi, Z., Rollefson, G.O. and Simmons, A.
- 1993 The Excavations at the Neolithic Community of Wadi Shu'eib, Central Jordan. *Syria* LXX: 235-238.
- Kenyon, K.
- 1957 *Digging Up Jericho*. Ernest Benn Limited: London.
- Köhler-Rollefson, I. and Rollefson, G.
- 1990 The Impact of Neolithic Subsistence Strategies on the Environment: The Case of 'Ain Ghazal, Jordan. In Bottema, S., Entjes-Neiborg, G. and Van Zeist, W. (eds.), *Man's Role in the Shaping of the Eastern Mediterranean Landscape*. 3-15. Rotterdam : Balkema.
- Levy, T.E. & Rosen, S.A.
- 1987 The Chipped Stone Industry at Shiqmim: Typological Considerations. In Levy, T.E. (ed.), *Shiqmim I. Studies concerning Chalcolithic Societies in the Northern Negev Desert, Israel* (1982-1984). British Archaeological Reports International Series 356: 281-294. British Archaeological Reports: Oxford.
- Lacelle, L.
- 1986 Bedrock, Surficial Geology, and Soils. In O. S. LaBianca and L. Lacelle, *Hesban 2: Environmental Foundations*, 23-58. Andrews University Press: Berrien Springs.
- McCartney, C. and Betts A.
- 1998 Dhuweila: Chipped Stone. In Betts, A. (ed.) *The Harra and the Hamad: Excavations and Explorations in Eastern Jordan, Vol. 1*. Sheffield Academic Press: Sheffield.
- Moorman, E.
- 1959 *The Soils of East Jordan: Report to the Government of Jordan*. Expanded Technical Assistance Program, no. 1132. Food and Agriculture Organization (FAO): Rome.

Nishiaki, Y.

- 1997 Neolithic Sickle Blade Elements from the Balikh Valley, North Syria. *Al-Rafidan* 18: 59-67.

Quintero, L., Wilke, P., and Waines, J.

- 1997 Pragmatic Studies of near Eastern Neolithic Sickle Blades. In Gebel, H. G., Kafafi, Z., and G. O. Rollefson (eds.) *The Prehistory of Jordan, II. Perspectives from 1997*, pp. 263-286. Studies in Early Near Eastern Production, Subsistence, and Environment 4. Ex Orient: Berlin.

Rollefson, G.

- 1988 Stratified Burin Classes at 'Ain Ghazal: Implications for the Desert Neolithic of Jordan. In Garrard, A. and Jebel, H., *The Prehistory of Jordan*, pp. 437-449. British Archaeological Reports: Oxford.
- 1989 The Late Aceramic Neolithic of the Levant: A Synthesis. *Paléorient* 15, 1: 168-173.
- 1992 Neolithic Settlement Patterns in Northern Jordan and Palestine. In: Tell, S. (ed), *Studies in the History and Archaeology of Jordan IV*: 123-129. Department of Antiquities: Amman.
- 1995 Burin Variability at Neolithic 'Ayn Ghazal, Jordan. In 'Amr K., Zayadine, E. and Zaghoul, M. (eds.), *Studies in the History and Archaeology of Jordan V: Art and Technology throughout the Ages*, 515- 518. Department of Antiquities: Amman.
- 1996 The Neolithic Devolution: Ecological Impact and Cultural Compensation at 'Ain Ghazal, Jordan. In Seger, J. (ed.), *Retrieving the Past. Essays on Archaeological Research and Methodology in Honor of Gus W. Van Beek*, pp. 219-229. Eisenbrauns: Winona Lake, IN.
- 2000 Ritual and social Structure at Neolithic 'Ain Ghazal. In Kuijt, I. (ed.), *Life in Neolithic Farming Communities: Social Organization, Identity, and Differentiation*, 163-190. Kluwer Academic/Plenum Publishers: Toronto.
- 2001 Personal Communication, August.

Rollefson, G., and Durand, K.

- 2001 Wadi Shu'eib, A Large Neolithic Community in Central Jordan: Final Report of Test Investigations. *Bulletin of the American Schools of Oriental Research* 321, 1-39.

Rollefson, G., Forstadt, M. and Beck, R.

- 1994 A Preliminary Typological Analysis of Scrapers, Knives and Borers from 'Ain Ghazal. In Gebel, H. G. and Kozlowski, S. K. (eds.), *Neolithic Chipped*

Stone Industries of the Fertile Crescent. Studies in Early Near Eastern Production, Subsistence, and Environment 1: 445-466. Ex Oriente: Berlin.

Rollefson, G. and Frölich, B.

- 1982 A PPNB Burin Site on Jebel Uweinid, Eastern Jordan. *Annual of the Department of Antiquities of Jordan* XXVI, 189-198.

Rollefson, G., Kaechele, Z. and Kaechele, J.

- 1982 A Burin Site in the Umm Utheina District, Jabal Amman. *Annual of the Department of Antiquities of Jordan* 26: 243-248.

Rollefson, G. and Kafafi, Z.

- 1994 The 1993 Season at 'Ain Ghazal: Preliminary Report. *Annual of the Department of Antiquities of Jordan* 38: 11-32.

- 1987 The Neolithic Village of 'Ain Ghazal, Jordan: Preliminary Report on the 1986 Season. *Bulletin of the American Schools of Oriental Research* 25 93-106.

- 1997 The 1996 Season at 'Ayn Ghazal: Preliminary Report. *Annual of the Department of Antiquities of Jordan* XLI: 27-48.

Rollefson, G., Kafafi, Z., and Simmons, A. H.

- 1989 The 1988 Season at 'Ain Ghazal, A Preliminary Report. *Annual of the Department of Antiquities of Jordan* 33: 9-26.

Rollefson, G. and Köhler-Rollefson, I.

- 1992 Early Neolithic Exploitation Patterns in the Levant: Cultural Impact on the Environment. *Population and Environment* 13: 243-54.

Rollefson, G. and Simmons, A.

- 1986 The Neolithic Village of 'Ain Ghazal, Jordan: Preliminary Report on the 1984 Season. *Bulletin of the American Schools of Oriental Research Supplement* 24: 145-164.

- 1987a The Neolithic Village of 'Ain Ghazal, Jordan: Preliminary Report on the 1986 Season. *Bulletin of the American Schools of Oriental Research* 25 93-106.

- 1987b The Life and Death of 'Ain Ghazal. *Archaeology* November/December: 38-45.

- 1988 The Neolithic Settlement at 'Ain Ghazal. In Garrard, A. and Jebel, H., *The Prehistory of Jordan*, 393-421. British Archaeological Reports 396 (ii): Oxford.

Rosen, S.

- 1997 *Lithics After the Stone Age: A Handbook of Stone Tools from the Levant*. Altamira Press: London.

Shehadeh, N.

- 1985 The Climate of Jordan in the Past and Present. In Hadidi, A. (ed.), *Studies in the History and Archaeology of Jordan II*, 25-37. Department of Antiquities of Jordan: Amman.

Siggers, J.

- 1997 *The Lithic Assemblage from Tabaqat al-Buma: A Neolithic Site in Wadi Ziqlab, Northern Jordan*. A Thesis Submitted in Conformity with the Requirements for the Degree of Doctor of Philosophy, Graduate Department of Anthropology, University of Toronto. University of Toronto: Toronto.

Simmons, A.

- 2000 Villages on the Edge: Regional Settlement Change and the End of the Levantine Pre-Pottery Neolithic. In Kuijt, I. (ed.), *Life in Neolithic Farming Communities: Social Organization, Identity, and Differentiation*, 211-230. Kluwer Academic/Plenum Publishers: Toronto.

Simmons, A., Rollefson, G., Kafafi, Z., Mandel, R., Al-Nahar, M., Cooper, J., Köhler-Rollefson, I., and Durand, K..

- 2001 Wadi Shu'eib, A Large Neolithic Community in Central Jordan: Final Report of Test Investigations. *Bulletin of the American Schools of Oriental Research* 321, 1-39.

Stekelis, M.

- 1951 A New Neolithic Industry: The Yarmukian of Palestine. *Israel Exploration Journal* 1: 1-19.

- 1972 *The Yarmukian Culture of the Neolithic Period*. Magnes Press: Jerusalem.

Walker Tubb, K. and Grissom, C.

- 1995 'Ayn Ghazal: A Comparative Study of the 1983 and 1985 Statuary Caches. In 'Amr K., Zayadine, E. and Zaghoul, M. (eds.), *Studies in the History and Archaeology of Jordan V: Art and Technology Throughout the Ages*. 437-447. Department of Antiquities: Amman.

Zohary, M.

- 1962 *Plant Life of Palestine*. The Ronald Press Company: New York.

APPENDIX A
LATE NEOLITHIC POTTERY VESSEL TYPES

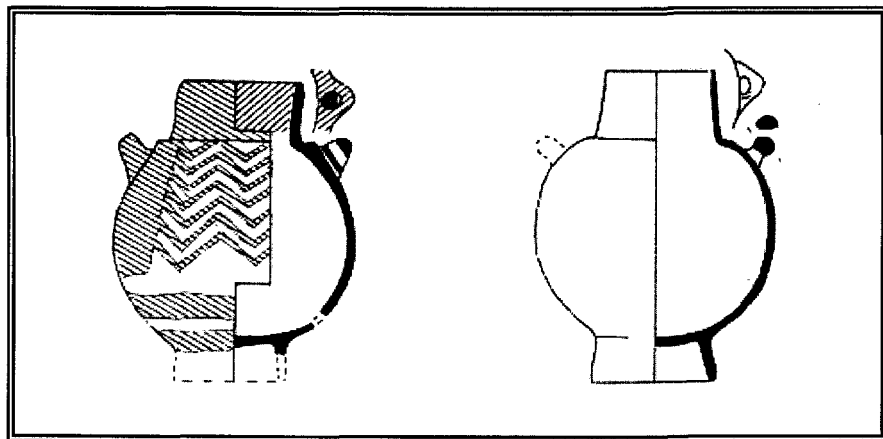


FIGURE A-1. Yarmoukian ware Byblos jars – Type D3 – note the ridge that encircles the vessel just above the handles (after Garfinkel 1999: 51).

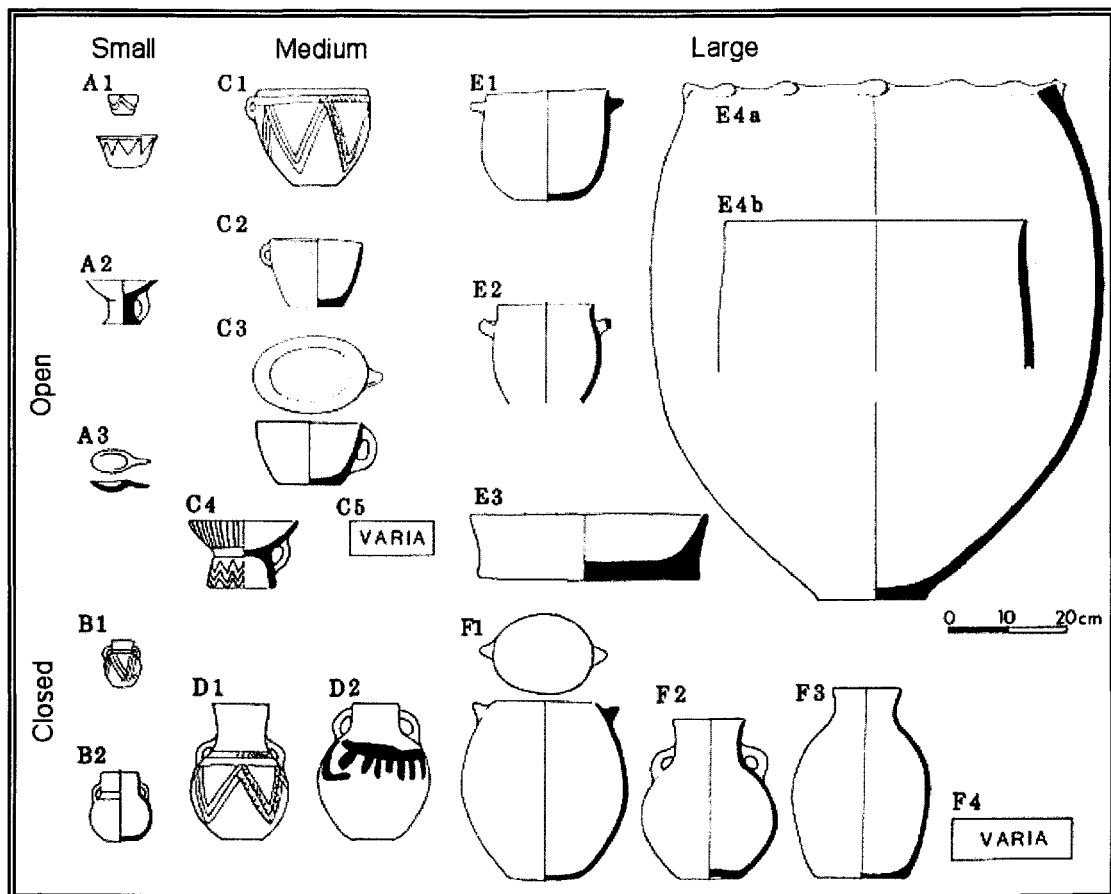


FIGURE A-2. Common LN pottery vessel types (after Garfinkel 1999: 21).

A1	Small Bowl or Cup	E3	Basin
A2	Small Chalice	E4	Pithos
A3	Spoon	B1	Miniature Jar
C1	Deep Decorated Bowl	B2	Small Jar
C2	Deep Undecorated Bowl	D1	Sha'ar Hagolan Jar
C3	Bowl with Large Handle	D2	Jericho IX Jar
C4	Large Chalice	F1	Holemouth jar
C5	Various Bowls	F2	Large Sha'ar Hagolan Jar
E1	Pot	F3	Handleless Jar
E2	Large Bowl	F4	Various Jars

APPENDIX B
PLATES: CHIPPED STONE TOOLS AND POTTERY



FIGURE B-1. Arrows. Clockwise from upper left corner - L7002, ha-Parsa point; L3034, ha-Parsa Point; L3012, Jericho point; L7559 Jericho point.



FIGURE B-2. Awls. Center - L2679; Clockwise from upper right corner - L5506; L5470; L5565; L5566.

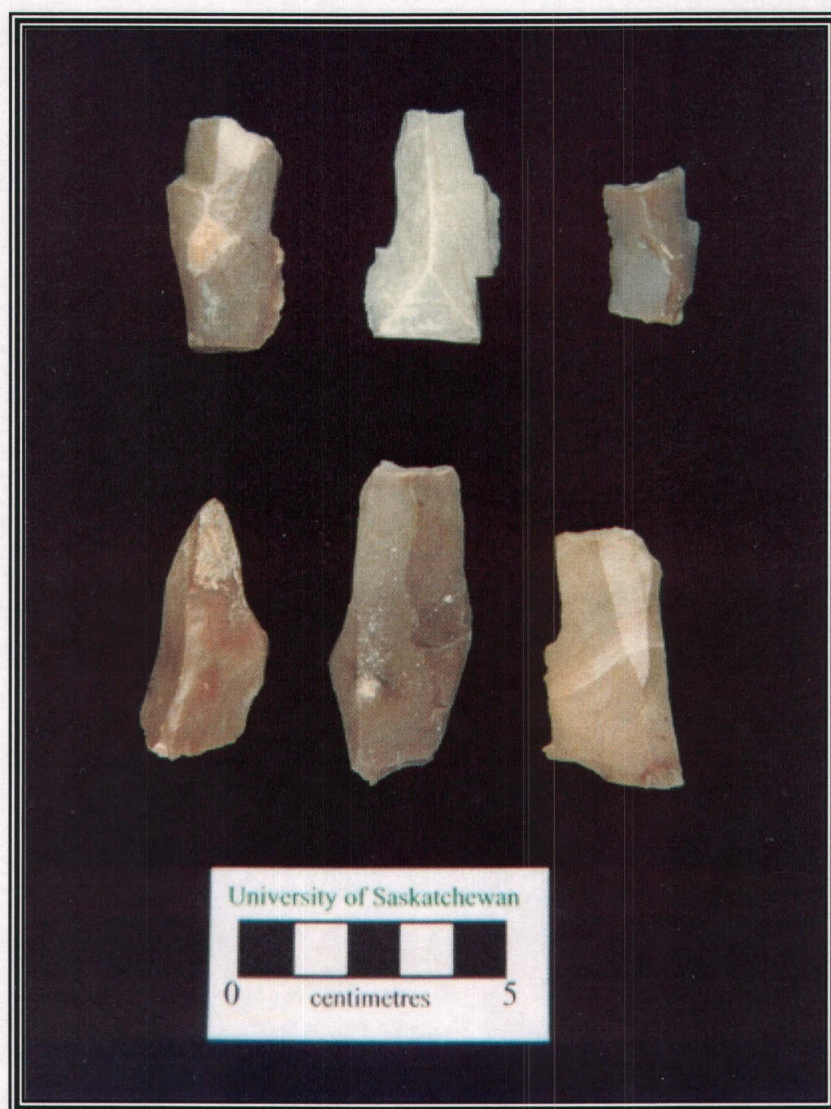


FIGURE B-3. Burins. Clockwise from upper left corner - L2480, multiple burins on concave truncation; L5480, multiple mixed burins; L6651, burin on concave truncation; L2368, burin on straight truncation; L 2334, multiple mixed bruins; L 6652, dihedral burin.



FIGURE B-4. Denticulates. L1510, coarse denticulated blade; L5901, fine denticulated bladelet; L2462, moderate denticulated flake; L2902, coarse denticulated bladelet; L2686, moderate denticulated blade; L2521, coarse denticulated blade; L6894, moderate denticulated blade; L2501, coarse denticulated blade; L2500, moderate denticulated blade; L1162 moderate denticulated blade.

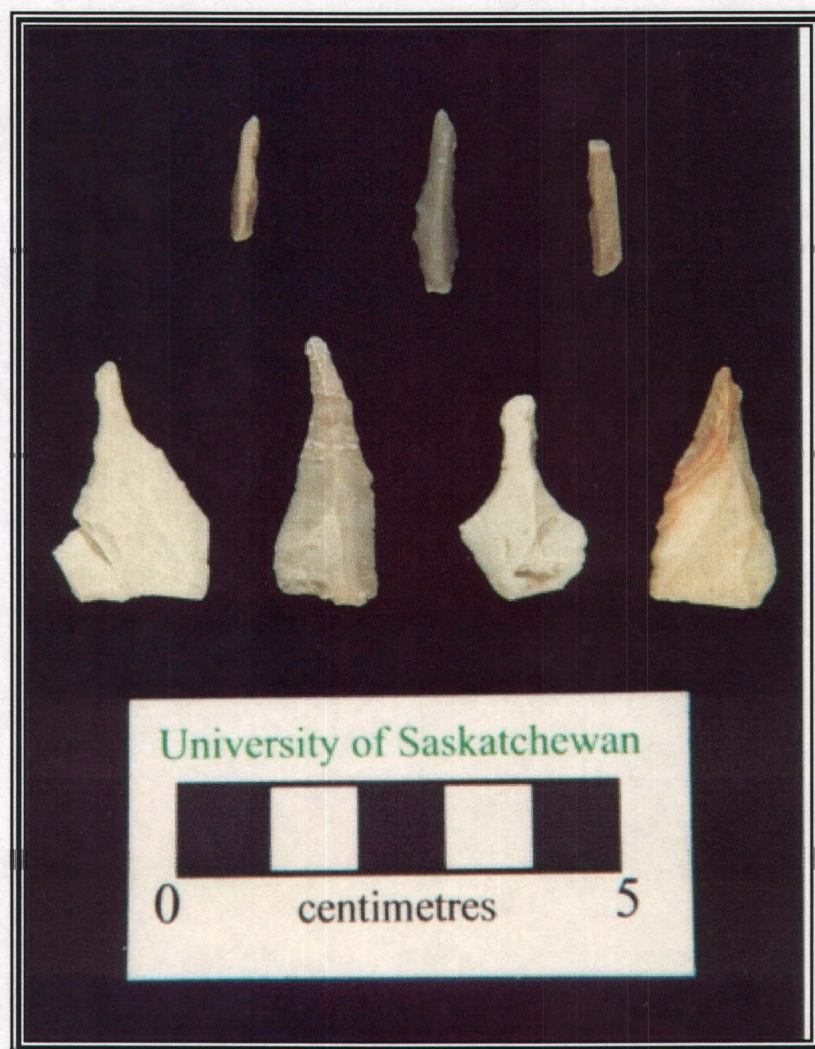


FIGURE B-5. Drills. Clockwise from upper left corner - L7003; L2809; L2863; L7193; L7201; L7391; L7086.



FIGURE B-6. Multiple Tools. Left to right - L2019, awl and concave side scraper; L1618, notch and awl; L2058, burin on concave truncation and awl.

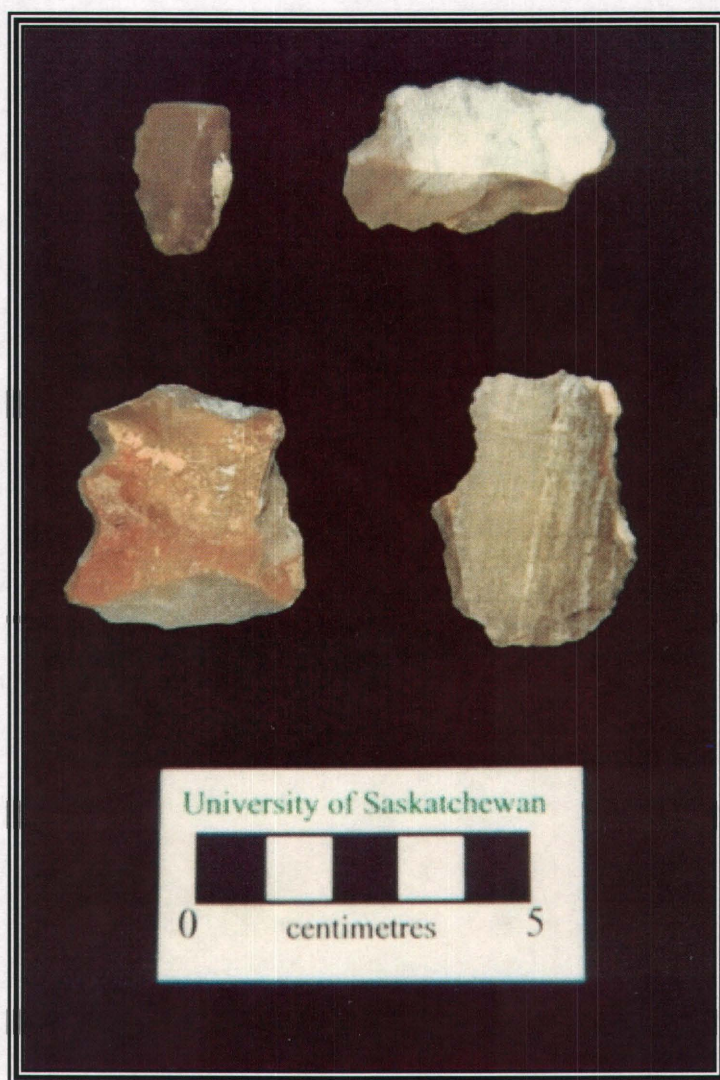


FIGURE B-7. Notches. Clockwise from upper left corner - L 2594, double notched flake; L1719 double notched flake on reworked side scraper; L1626, single notched flake; L2350, double notched flake.



FIGURE B-8. Scrapers. Clockwise from upper left corner - L1693 tabular scraper; L2640, side scraper (nosed); L5749, endscraper; L2343, circular scraper; L2329, core scraper.

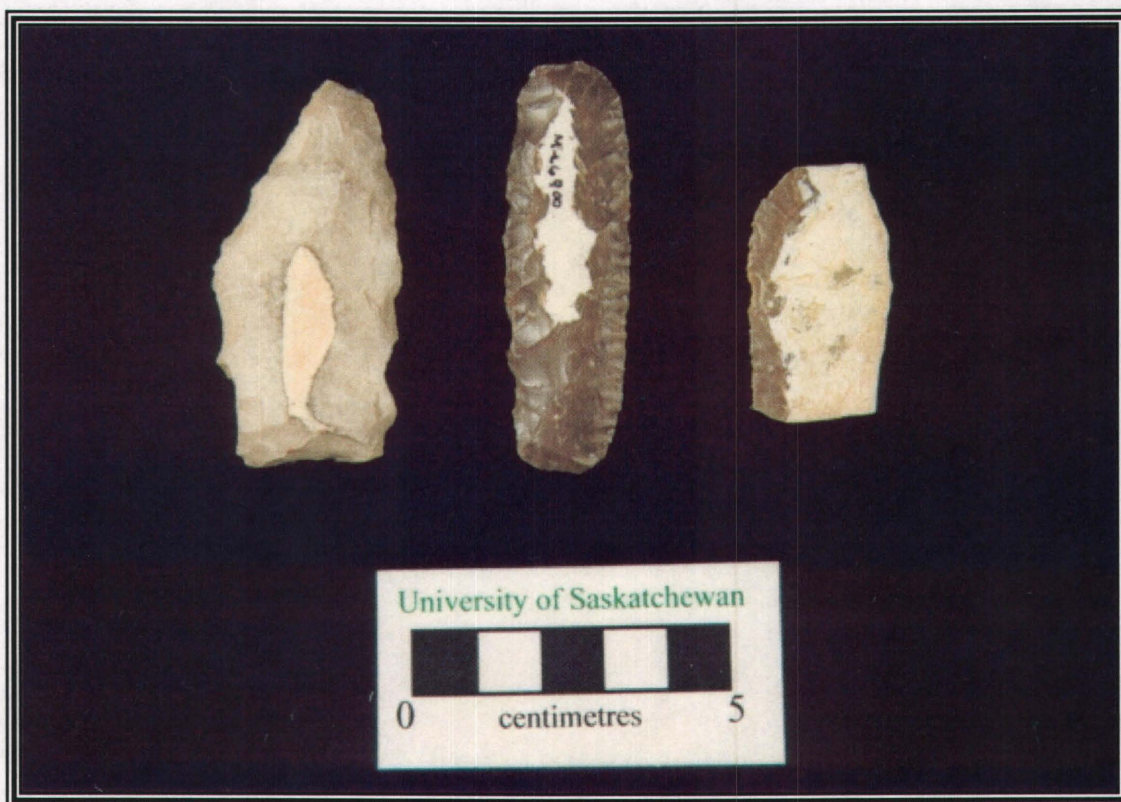


FIGURE B-9. Tile knives. Left to right - L1807; L6900; L7060.



FIGURE B-10. Truncations. Left to right - L5597, bipolar oblique truncation; L7204, unipolar oblique truncation; L5672, unipolar concave truncation.



FIGURE B-11. Retouched pieces. Clockwise from upper left corner - L2699, retouched spall; L1512, backed and retouched bladelet; L1499, retouched blade segment; L2346, retouched flake; L2405, abruptly retouched flake.

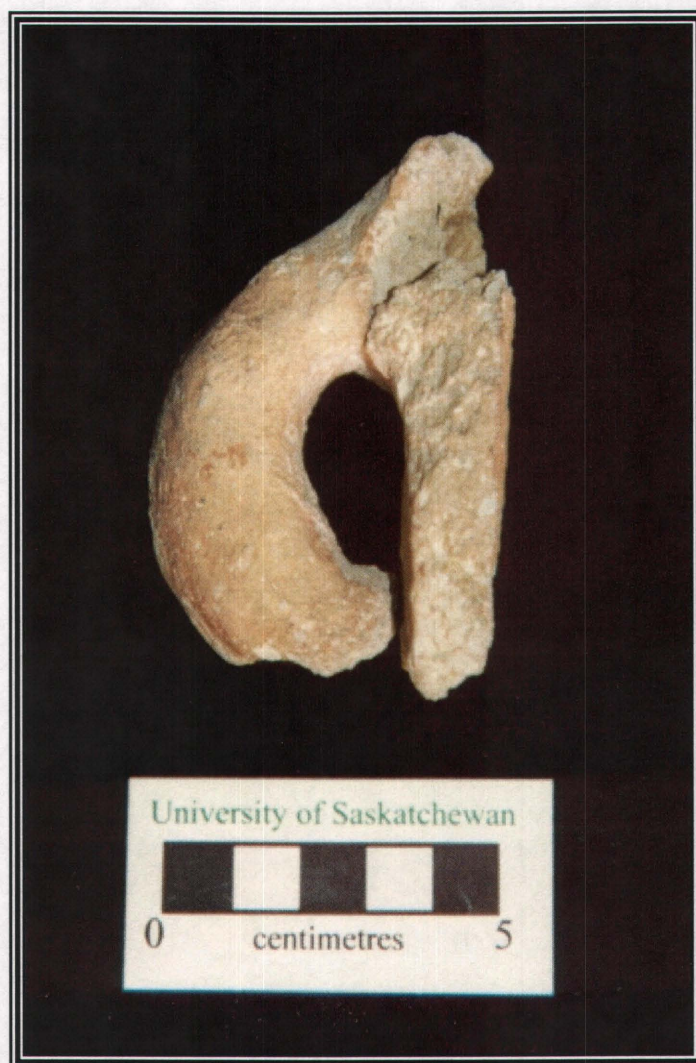


FIGURE B-12. Loop handle (WT40-140-4).



FIGURE B-13. Lug handle on Byblos jar. WT40-191-21- note the red painted decoration with the inverted triangle motif.

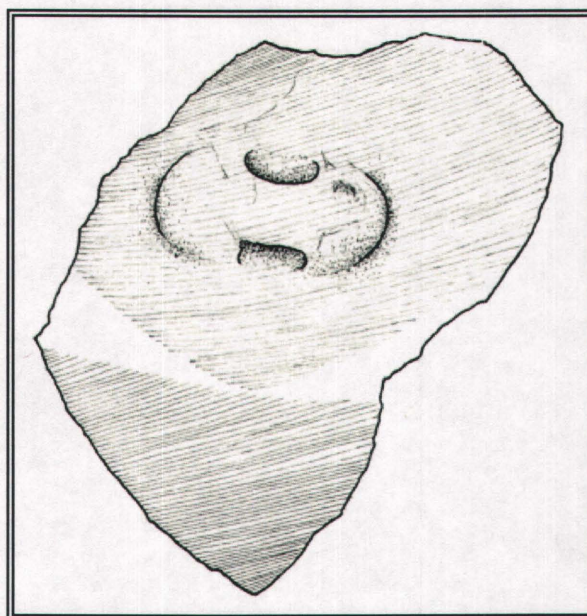


FIGURE B-14. Illustration of lug handle on Byblos jar - illustration by Erinn Schnider.



FIGURE B-15. Decorated Pottery. Clockwise from upper left corner - red painted sherds WT40-229-24 and WT40-217-22; red painted/slipped sherds WT40-191-20, WT40-215-23, and WT40-229-25 (center).



FIGURE B-16. Decorated Pottery - wide painted lines. Left to right - WT96-200-12, 13, 14, 15 and WT96-200-16.



FIGURE B-17. Decorated Pottery. Left to right - WT40-191-18, herringbone incised decoration inside incised frame; WT40-191-17, incised frame with red paint/slip; WT40-191-33, burnished red slip/paint.



FIGURE B-18. Decorated Pottery - White slipped sherd WT96-202-7.